

A CHILTON

PUBLICATION

Salute to  
New England

See page 123

NATIONAL METALWORKING WEEKLY

June 24, 1954

ITS PAGE 2

UNIV. OF MICHIGAN

JUN 25 1954

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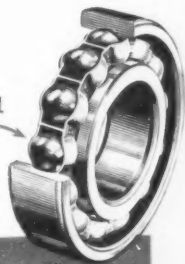
BORN IN  
NEW  
ENGLAND...  
SERVING THE  
NATION AND  
THE WORLD!

Three New England craftsmen, one room, 200 square feet of space . . . that was New Departure at its founding two thirds of a century ago.

Since then our plants have grown—and so has our role in national and world industry. We have been a leader in perfecting interchangeable precision manufacturing in mass production . . . originated many ball bearing types in world-wide use today . . . contributed much to the development of alloy steels and heat-treating processes . . . advanced the design of precision grinding machines and ultra-precise gauging and testing equipment.

In the future, too—expect the finest *first* from New Departure!

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**BALL BEARINGS**

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

Plants also in Meriden, Connecticut, and Sandusky, Ohio

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# 44% FASTER



## NEW ROTOR D-4 GRINDER pays for itself in one month



ASK FOR  
BULLETIN  
NO. 43

**JOB:** Grinding edges and holes of flame-cut tube hanger plates with 4" plug wheels.

**FORMERLY:** Used 4500 rpm grinders. Output: 50 pieces per day.

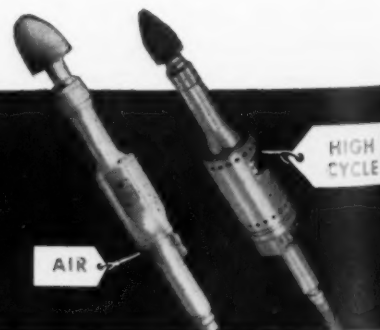
**NOW:** Use new Rotor D-4 8500 rpm Grinders. Output: 72 pieces per day.

**RESULTS:** 44% more output paid off cost of new Rotor Grinders in one month. After that, it's pure savings.

Find out from your nearby Rotor Analyst how *you* can cut costs with the D-4 and other new Rotor portable tools! Ask for a demonstration.

THE **ROTOR TOOL** CO.  
CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS





# "Holding Power"

## The Story of Fasteners

*New  
Industrial  
Motion Picture  
Now Available*

"Holding Power" is an interesting new industrial film which tells the complete story of fasteners. It describes common, everyday fastener items, such as bolts, nuts, rivets, track bolts and spikes, and shows how important they are to our modern way of life. The film also includes roof bolts, high-strength bolts, oil-well sucker rods, and a wide range of ingeniously designed special bolts.

"Holding Power" is in color, with sound. It is on 16 mm film, and runs about 25 minutes.

The film is intended not only

for those closely associated with the fastener field, but also for general-type audiences. There is no charge for this educational picture, except for return postage. If you would like to use a print, write fully to Room 1024, Publications Department, Bethlehem Steel Company, Bethlehem, Pa., preferably well in advance of your showing date.

BETHLEHEM STEEL COMPANY  
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation



## BETHLEHEM STEEL

June 24, 1954

★Starred items are digested at the right.

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THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 58th Sts., Philadelphia 26, Pa. Entered as second class matter, Nov. 8, 1933, at the Post Office at Philadelphia under the act of March 3, 1879. \$5 for 1 year, \$8 for 2 years in United States, its territories and Canada; other Western Hemisphere Countries, \$15, other Foreign Countries, \$25 per year. Single copies, 50¢. Annual Review Issue, \$2.00. Cable: "Ironage," N. Y.

Address mail to 100 E. 42 St., N. Y. 17, N. Y.

## MARKETS & PRICES

**STOCKPILING DELAYED BY FALSE START** — P. 47  
Lead market flip-flopped on refusal to purchase for expanded stockpile program. Ceiling prices had been set at under 14¢ for lead, 13¢ for zinc. Lead was offered at 14.25¢, then 14¢. ODM rewords directive to buy at market price. Metals regain strength and price hikes are definitely possible.

**GALVANIZED SHEETS SHOW NEW STRENGTH** — P. 55  
Shipments of galvanized sheets are lagging behind the 1953 pace—but they're doing better than other steel products. After a lull in late '53 and early '54, things have started picking up. While tonnages can be obtained on 6-week delivery, mills are booked solid through August.

**RAILROAD PIGGY-BACK PLANS HIT ICC SNAG**—P. 57  
Six railroads last week ran into a roadblock that may keep their piggy-back plans stalled until next January. ICC has suspended tariffs on the day before roads were to start hauling truck trailers on flat cars. New York Central working with truckers can go ahead this summer.

**DEVELOP BETTER POWER DRIVING AIDS SOON** — P. 70  
Trend toward larger, heavier, higher powered cars is demanding immediate improvements of driving aids and accessories. Auto-Lite working on central system to operate brakes steering, accessories. Improved headlights and brakes are slated for debut in mid-1954. Chrysler unveils new, super proving ground.

**STEEL WAGE PATTERN TO HIT FABRICATORS** — P. 243  
A large segment of metalworking is holding its breath this week, waiting for the impact of the steel wage settlement. A great many other wage agreements are usually patterned after steel and if a wage increase is granted it will be a tough bite to chew for a lot of smaller companies already pinched.

**STEEL MARKET SLOWS FOR JULY VACATIONS** — P. 249  
Large tonnage fabricators notify producers of 2-3 week vacation shutdowns. See July as low point in last half. Slow market uptrend should resume in August. Far East situation not reflected in market as yet. Tin plate, oil country and galvanized sheets are strong. Structural, bars, plates lagging.

# in Metalworking

## Feature Issue

### ENGINEERING & PRODUCTION

#### ULTRASONICS IMPROVE JOINTS IN ALUMINUM — P. 97

Ultrasonic equipment, powerful enough to effectively shatter oxide films, helps to produce strong soldered joints in aluminum without using flux. Even anodized, alodized and similarly treated surfaces can be soldered by this method. Breaking up the tough oxides in the soldering zone permits solder to alloy with aluminum.

#### NEW METHOD CUTS CORROSION TEST TIME — P. 100

Corrosion test time for some stainless steels can be sharply cut with a new electrolytic oxalic acid test. In types 302, 304 and 316, test time can be cut from days to minutes. Test can also be used to show whether stabilized grades are completely stabilized. These grades cannot be tested because of sigma formation.

#### NEW SYSTEM IMPROVES SAFETY RECORD — P. 104

Company found that its high lost-time accident rate had boosted insurance premiums sharply. Management set up its own reserve fund to cover accident expense, and simultaneously launched a vigorous safety campaign. Lost time injuries and clinic visits have dropped steadily although employment has more than doubled.

#### TITANIUM FUSION WELDING IN PRODUCTION — P. 106

Growing use of titanium in aircraft prompted The Glenn L. Martin Co. to undertake a study which would establish the best techniques for production line welding. Inert gas-shielded welding was adopted because of its better protection of the weld zone against atmospheric contamination. Argon provides a stable arc.

#### NEW METHOD FOR COLD ROLLING SPLINES — P. 110

A new cold rolling technique developed by Michigan Tool Co. for splines, grooves and serrations promises better surface finish, a reduction for hobbing and complete elimination of chip disposal. Other advantages include favorable prestressing of the shaft, higher torsional strength, and better tool life.

#### NEXT WEEK — COATINGS EXPAND METALLIZING USES

Wider application of the metallizing process is possible through the use of molybdenum coatings. They provide a surface material with good wear resistance as well as a bonding coat for other metals. Bonding method is simple and dependable. No preliminary surface preparation other than cleaning is required.

## Special Study on New England

Following are highlights of an extensive study of New England just completed by THE IRON AGE. Many of the top students of the New England economy cooperated with THE IRON AGE in preparing this penetrating analysis which begins on p. 123.

#### METALWORKING: BACKBONE OF INDUSTRY — P. 124

N.E. is undergoing an industrial transition. Gains in hard goods more than offset losses in soft goods.

#### RESEARCH FACILITIES TOP THE NATION — P. 127

N.E. has outstanding research facilities. But manufacturers aren't yet taking full advantage of them.

#### MACHINE TOOL BUILDERS LIKE NEW ENGLAND—P. 130

Answering an IRON AGE survey, they overwhelmingly testified N.E.'s a good location for them.

#### LABOR: N. E.'s MOST PRECIOUS RESOURCE — P. 132

Skills of generations have built a reputation for quality, still the strongest lure for industry.

#### SEE NEW ENGLAND PRODUCTS IN ACTION — P. 134

Four pages of action pictures show products that are maintaining the area's reputation for quality.

#### FINANCIAL RESOURCES AND INNOVATIONS — P. 138

With 13 pct of U. S. financial resources, N.E. also leads in state and local development corporations.

#### INDUSTRIAL OPPORTUNITIES IN N. E. TODAY — P. 140

There are special opportunities for industry in electronics, machinery, instruments, chemicals, paper.

#### COPPER AND BRASS THRIVE IN NEW ENGLAND—P. 142

Heart of the vital brass mill industry is still in the Naugatuck Valley where it started in 1802.

#### MEASURE N. E. SPENDING, SAVING, MFG. — P. 144

Statistics show that New Englanders depend more heavily on manufacturing, that they earn more, spend more, and save more than the average of all Americans.

#### WANT EXTRA COPIES?

A limited number of extra copies of this special study will be available upon request to Readers' Service Dept., THE IRON AGE, 100 E. 42nd St., New York 17, N. Y.





From the batch type installation at the left martempering base detonator fuses, to the huge mechanized furnaces austempering automobile bumpers illustrated below, Ajax Electric Salt Bath Furnaces are replacing old-style quench and temper methods for a wide variety of steel products.

From ring gears to plow points . . .  
From bearing races to cast iron cylinder sleeves . . .

From uniformly shaped metal parts to odd and irregular sizes . . .

Scores of installations have proved the tremendous possibilities for economy, greater speed and efficiency in martempering and austempering, because all water and oil quenches are eliminated.

Distortion is so negligible that parts can be machine finished *before* hardening. Final grinding is eliminated or materially reduced. Scale, decarb and quench cracks are eliminated. Toughness and ductility are increased. The work is done materially faster—in less floor space—with lower labor costs. Let the Ajax Metallurgical Service Laboratory prove these claims on a specimen batch of your actual parts, under actual working conditions.

Write for Ajax Bulletin 120

**AJAX ELECTRIC COMPANY**

904 Frankford Ave., Philadelphia 23, Penna.

World's largest manufacturer of electric heat treating furnaces exclusively



**AJAX**

**ELECTRIC SALT BATH FURNACES**

In Modern  
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the Trend  
is to  
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and  
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Editorial, Advertising and Circulation  
 Offices, 100 E. 42nd St., N. Y. 17, N. Y.  
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One of the Publications Owned and  
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## Editorial

The Iron Age

FOUNDED 1855

## Where To Now?

IT MIGHT be hoping for too much to expect President Eisenhower and Sir Winston Churchill to come to a definite, realistic and understanding plan to check Communist aggression. But if their meeting does not bear such fruit we are in for another and another Korea.

There is a mistaken idea that diplomats know more than the so-called common people. Or that men like Churchill are omnipotent in negotiations or in international understanding. Nothing could be further from the truth. Certainly the Koreans know such notions are false; and soon the Vietnamese will know it too—if they have not already suspected it.

This country has lost face with Asia and the Administration has lost standing at home because of its reticence to tell the people just how serious things are in Asia—and in France. To make any more agreements which would bring a Panmunjom; or Berlin or Geneva type of failure would be disastrous.

Almost everyone knows by now that Communists infiltrate, line up with nationalistic groups, sow their seeds, soften things up and then move in. The rest is easy—they agree to "negotiations"; hold what they have and grab as much more as they can while we bicker and fail to find a common policy.

The free world cannot stand too many more Genevas. Nor can America be the leader she must be if our top level people do not take the nation into their confidence. So far the man on the street has to try and read between the lines of news stories to find out what's going on in the world.

It is clear that the Vietnamese will be divided up as were the Koreans. It is clear that Laos and Cambodia are in danger. Thailand is just another step. If you are confused, remember how the Reds infiltrated into Guatemala.

If we are to stand by and "negotiate" as one country after another goes under the hammer and sickle then we lack something—and not even Churchill can supply that.

Tom Campbell

Editor



*King-size*

Here is one of the year's largest planers, a GRAY, immense in size, yet so superbly engineered and magnificently built that its precision performance is a marvel to behold. All GRAY planers from king-size Giants to eager Cubs are built for high production. They have more original engineering developments and production features than any other planer. They are in such demand that GRAY is the largest planer builder, further proof that *Quality doesn't cost . . . it pays.*

The G. A. GRAY Co., Cincinnati, Ohio



# Dear Editor:

## Letters from readers

### Trapped Rubber Dies

Sir:

Your article "Drop Hammer, Trapped Rubber Dies Form Aircraft Parts Faster" in the May 6 issue was of interest to us. Can you tell me where to find more information on the use of rubber dies in press brake forming?

E. L. BROWN  
Product Engineering  
Armco Drainage & Metal Products, Inc.  
Middletown, Ohio

The rubber used was 80-90 shore rubber, developed especially for this application by Rubbercraft Corp. of California, 1800 W. 220th St., Torrance, Calif.—Ed.

### Timid Soul

Sir:

MAY WE HAVE PERMISSION TO REPRINT WITH CREDIT YOUR EDITORIAL "ARE YOU A TIMID SOUL?" FROM JUNE 10 ISSUE.

K. M. SCOTT  
Northwestern Steel & Wire Co.  
Sterling, Ill.

### Two-Stage Furnace

Sir:

Our extrusion people are very interested to know if you can help them on the furnace item at the bottom of the May 20 Newsfront.

J. R. HIGHT  
Allegheny Ludlum Steel Corp.  
Pittsburgh

The American licensee is Salem-Brosius, Inc., 240 Fourth Ave., Pittsburgh 22.—Ed.

### Gear Inspection

Sir:

Please send me six tear sheets of the article "Gear Inspection, Key to

Better Performance" from the May 27 issue.

C. H. SWEET

Minneapolis-Moline Co.  
Minneapolis

### God And The H-Bomb

Sir:

I am an editor of a small internal house magazine for our company. Not too long ago I ran across your editorial titled, "God And The H-Bomb." I thought it was unusually good and felt that such an article will be timely for quite a while.

I would like permission to print this editorial, giving a credit line to you and THE IRON AGE. Our publication is company sponsored and as such is not published for commercial purposes.

BOB HILL  
Editor of the Carrier  
Salisbury Axle Works  
Fort Wayne, Ind.

### Sorry

Sir:

The photographs at the bottom of p. 129 in the article "How Heat Treating Improves Modern High Strength Irons" in the June 10 issue have been transposed. Also, the caption under the photomicrograph "Annealed 5 hours at 1350°F . . ." should have stressed the fact that this high temperature caused a 30 pct drop in tensile strength.

In quench hardening, the casting should first be slowly heated to 1100°F (not 100°F) followed by more rapid heating to 1575-1600°F (p. 126).

C. R. AUSTIN  
Meehanite Metal Corp.  
New Rochelle, N. Y.

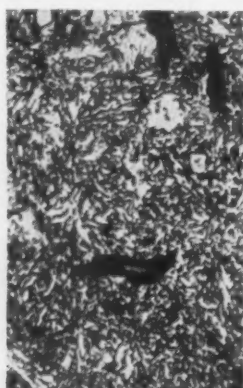
The photomicrographs in their correct order are shown below.—Ed.



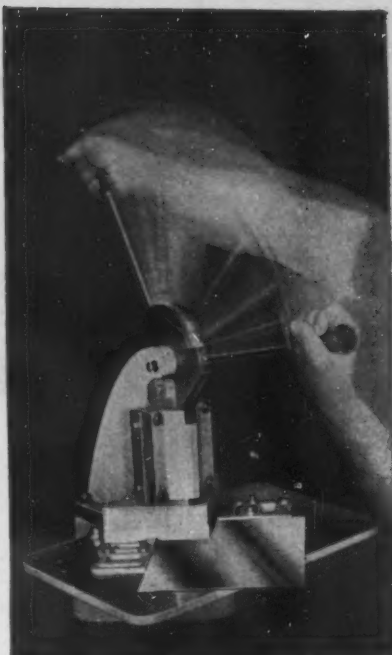
AS CAST GA Meehanite (229 Bhn) has tensile strength of 57,000 psi.



BUT 5 hr anneal at 1350°F and slow cool gives GA only 41,000 psi tensile, 179 Bhn.



FILE HARD (555 Bhn) martensitic structure of quenched GA iron.



## Notching Sheet Materials?

Do It Quickly, Easily with a DI-ACRO\* NOTCHER

Speed up notching operations, eliminate the need for heavy presses and dies with a Di-Acro Notcher. A 6"x6" notch can be made in 16 gauge material in one operation. Many straight shearing jobs also performed.

\*pronounced DIE-ACK-RO

BOTH HAND  
AND POWER  
OPERATED MODELS  
AVAILABLE



Di-Acro Power Notcher is especially designed for operations where high rate of production must be maintained. Motor driven flywheel and all moving parts housed in welded, steel cabinet.

Hand operated Di-Acro Notcher is ideal for short run production or experimental use.

WANT MORE INFORMATION?



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Gives complete details on Di-Acro Notchers, Benders, Brakes, Press Brakes, Punch Presses, Rod Parters, Rollers, Shears and Spring Winders.

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## MIDVALE FORGINGS...*Shape up for tougher service*

As the giant press forges the 500,000 pound ingot, careful experienced hands guide every stroke . . . size and shape it to the required dimensions. Careful working and heating will finally shape this forging to an overall length of 46'-4¼" with an outside diameter of 61½".

Midvale forging quality is the result of absolute control from start to finish. From the time the scrap and pig iron are charged into the open hearth or electric furnaces "quality tests" and skilled hands take over. Ingots are forged on presses ranging from 1,500 tons to 14,000 tons capacity. Heat treating cycles based on Midvale's long experience are thoroughly followed

to produce the maximum in mechanical properties. Final machining is done on equipment capable of handling rough or finish machining on practically any size product.

This is the reason Midvale forgings—whether 300 or 300,000 pounds are noted for their toughness, long service and never failing performance. The men of Midvale working with the right equipment and facilities offer a source of forgings, steel mill rolls and rings unsurpassed in quality and extra performance. Let their services, long experience and willingness help solve your forging problems.

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Offices: New York, Chicago, Pittsburgh, Washington, Cleveland, San Francisco

# MIDVALE

FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS



# Fatigue Cracks

by William M. Coffey

## The Secret

In reviewing the lives of successful men — captains of industry, admirals, writers and so forth — biographers invariably search pretty far back for the key that made these men rise above their brothers.

Each of them, of course, "showed promise at an early age." Lord Nelson, naturally, astounded the neighborhood by tying a double becket bend at the age of three. He was a cinch to become Britain's greatest admiral. We see where Robert Young's (Prop., New York Central) phenomenal success has been traced to his first business experience with a roadside celery juice stand at the age of six. Or take William Shakespeare. His third grade teacher predicted fame and fortune for William when he dumbfounded the whole class by spelling "rhinoceros" correctly. And so it goes. "Application and hard work", too, has something to do with it, they say.

Here's how a successful restaurant owner in New York City, Jim Downey, made it to the top. We quote from the back of Jim Downey's menu:

Jim Downey, the owner of this establishment, first came to this country as a poor Irish immigrant boy. It was early in his life that he decided upon two things: First of all, he set becoming a restaurant owner as his goal in life. Secondly, he assured himself that if he was to become a success he would have to work night and day, constantly and industriously. He set out in life keeping these goals in mind. As a young man he worked as a waiter, busboy, cook, bartender, even as a cashier and steward in bars and restaurants.

Some days he worked twenty hours, others he went without sleep at all. One morning, after years of backbreaking toil, he sat down and counted the fortunes of all his labor. He had saved thirty-four dollars and sixty-three cents. He went right down to Belmont, stuck it all on a hundred and fifty to one shot. The horse won and that is how he got enough money to buy the establishment you are sitting in today.

## The Line-Up

July is National Iced Tea Time

Month, the whole month. Also National Ice Cream Festival Month. Broken down by days—

July 13—Nathan Bedford Forrest's Birthday. Legal holiday in Tennessee.

July 14—Ground Observer Corps Day.

July 20-26—National Bow Tie Week.

July 24—Pioneer Day. Holiday in Utah.

July 25-31—National Inventors Week.

July 30—Joseph Lee Day. Sorry, no holiday, no place.

All of next month will be National Sandwich Month. August, that is.

July 4th will be Independence Day:

*On the Fourth of July some three years ago,*

*Cousin Snoof dropped a match at the fireworks show.*

*When he left, Snoof was clinging, with muscles of steel,*

*To a glowing, revolving, high-powered pinwheel.*

*Now, newspapers say "flying saucers" go by,*

*But we know it's Snoof still traveling the sky.*

The above was contributed by one of our subscribers who, we're sure, would prefer to remain anonymous. Name of author will be sent on request, however.

## Puzzlers

The following members of the Flagpole Sitters Union solved correctly the flagpole ladder problem (June 3 issue). Oh, the answer: the ladder would be 105 ft tall and would be placed on the base line between the 100 ft pole and the 80 ft pole, 68 ft from the 80 ft pole, 32 ft from the 100 ft pole and 86 ft from the 60 ft pole.

Charlsie, after all that work . . . didn't quite make it. Fire Len Bickel. Paul T. Brugmann, C. W. McKinley, P. A. Smelter, Harry Ebert, Charles H. Severs, Edwin R. Bartlett, James Rhodes, Nora LaDow are the winners. Many got the length of the ladder ok but didn't place it right, we think.

## New Puzzler

A farmer dies, leaving 17 cows to his 3 sons. His will specifies that the cows be divided among his sons so that the oldest's share will be one-third; the next son's, one half; and the youngest's one-ninth. How did the sons divide the cows without slaughtering them?

## Do a Better Job Faster

cut cleaning costs  
right down the line

**METALWASH PARTS WASHERS**, designed for alkaline-, neutral emulsion-, or solvent-type cleaners, are manufactured in five basic types, with any cycle, and in any size required.



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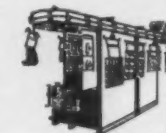
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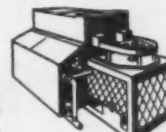
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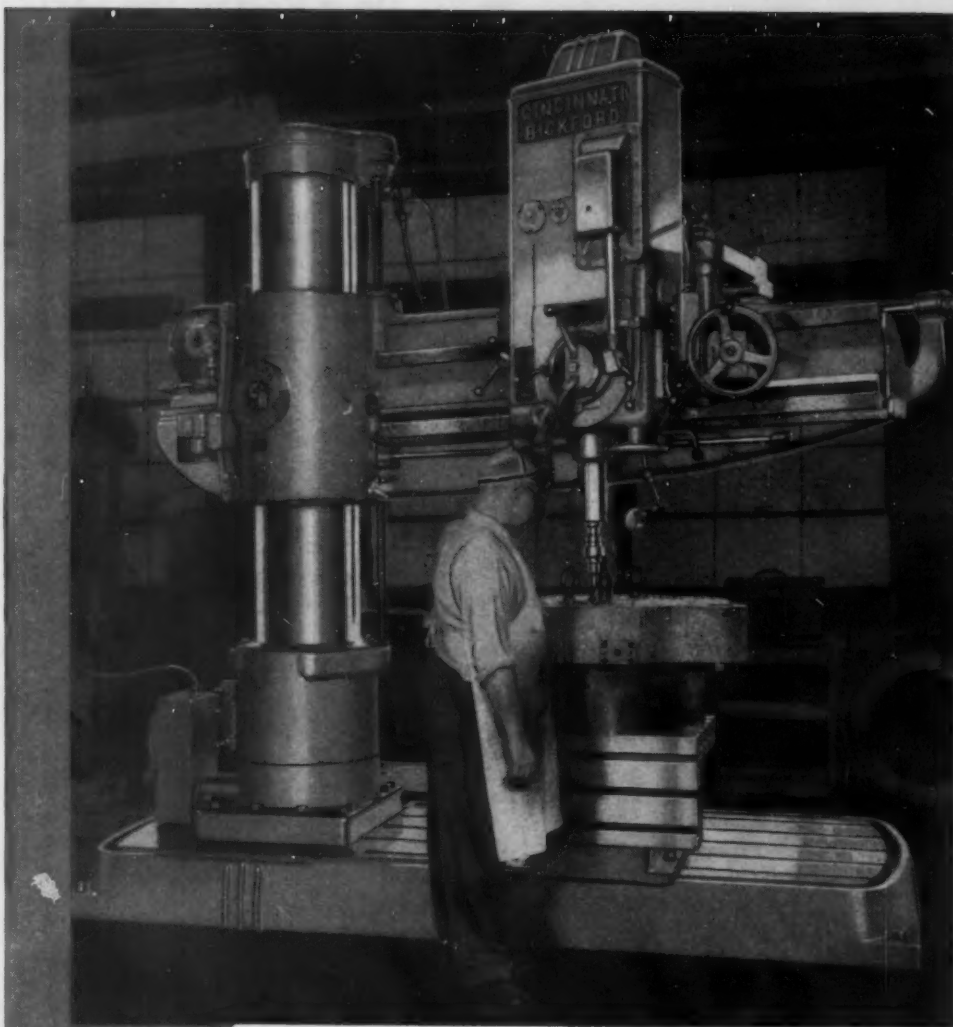
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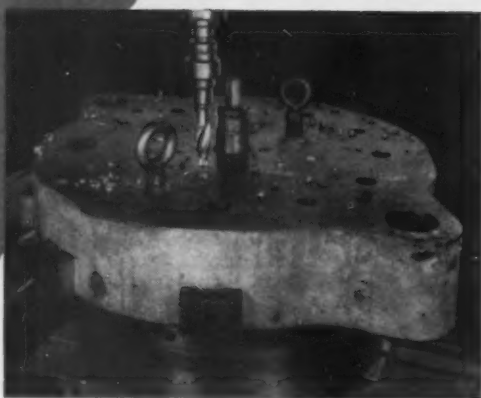
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## Dates to Remember

### Meetings

#### JUNE

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS—Semiannual meeting, June 28-30, New Ocean House, Swampscott, Mass. Society headquarters are at 62 Worth St., New York.

#### JULY

AMERICAN ELECTROPLATER'S SOCIETY—Annual convention, July 12-15, Statler Hotel, New York. Society headquarters are at 445 Broad St., Newark, N. J.

WESTERN PLANT MAINTENANCE SHOW—July 13-15, Pan Pacific Auditorium, Los Angeles. Management: Clapp & Pollak, 341 Madison Ave., New York.

#### EXPOSITIONS

ASSN. OF IRON & STEEL ENGINEERS—Annual convention with Iron & Steel Exposition, Sept. 28-Oct. 1, Public Auditorium, Cleveland. Association headquarters are at 1010 Empire Bldg., Pittsburgh.

AMERICAN SOCIETY FOR METALS—National Metal Exposition, national metal congress, Nov. 1-5, Palmer House, Chicago. Society headquarters are at 7301 Euclid Ave., Cleveland.

TRUCK-TRAILER MANUFACTURERS ASSN., INC.—Summer meeting, July 22-23, Edgewater Beach Hotel, Chicago. Association headquarters are at National Press Bldg., Washington.

AMERICAN HOME LAUNDRY MANUFACTURERS' ASSN.—Semiannual meeting, July 25-28, Grand Hotel, Mackinac Island, Mich. Association headquarters are at 20 N. Wacker Drive, Chicago.

#### AUGUST

MINING ASSN. OF MONTANA—Summer meeting, Aug. 1-2. Association headquarters are at 505 Montana Standard Bldg., Butte, Montana.

#### SEPTEMBER

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Fall meeting, Sept. 8-10, Schroeder Hotel, Milwaukee. Society headquarters are at 29 W. 39th St., New York.

METAL POWDER ASSN.—Fall meeting, Sept. 10-12, The Homestead, Hot Springs, Va. Association headquarters are at 420 Lexington Ave., New York.

INSTRUMENT SOCIETY OF AMERICA—International Instrument Congress and Exposition. Annual meeting, Sept. 13-24. Philadelphia Society headquarters are at 1315 Allegheny Ave., Pittsburgh.

NATIONAL METAL TRADES ASSN.—Annual Eastern plant management conference, Sept. 15-17, Sagamore Hotel, Lake George, New York. Association headquarters are at 122 S. Michigan Ave., Chicago.

COMPRESSED AIR & GAS INSTITUTE—Sept. 15-17, Skytop Lodge, Skytop, Pa. Institute headquarters are at 90 West St., New York.

NATIONAL PETROLEUM ASSN.—Annual meeting, Sept. 15-17, Atlantic City, N. J. Association headquarters are at Munsey Bldg., Washington.

TRUCK BODY & EQUIPMENT ASSN., INC.—Annual meeting and exposition, Sept. 20-22, Statler Hotel, Buffalo. Association headquarters are at 403 Washington Board of Trade Bldg., 1616 K St., Washington, D. C.

AMERICAN MINING CONGRESS—Metal mining convention and exposition, Sept. 20-23, Civic Auditorium, San Francisco. Headquarters are at 1200-18th St., Washington.

PACKAGING MACHINERY MANUFACTURERS INSTITUTE—Annual meeting, Sept. 23-26, Grove Park Inn, Asheville, N. C. Institute headquarters are at 342 Madison Ave., New York.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Petroleum mechanical engineering conference, Sept. 26-29, Statler Hotel, Los Angeles. Society headquarters are at 29 W. 39th St., New York.



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## THE IRON AGE Newsfront

**A LEAKPROOF SEAL FOR HYDROGEN RETORTS** used as annealing furnaces has been made by shaping aluminum bar. Woven asbestos is cemented on the face and back of the metal seal, in the seal flange on the face of the retort, and on the cover plate. The seal removes easily when the furnace is to be loaded or unloaded.

**RADAR WARNING OF STORM CENTERS AHEAD** may soon be possible for aircraft use, meteorologists report. A cockpit radar screen would give the pilot plenty of advance warning of bad weather.

**FEWER BASHED BUMPERS** are claimed for a new device to ease parking worries. A spring antenna hooks to the underside of either bumper, projecting 8 in. forward and rearward. If the antenna touches any object, a dashboard light warns the driver.

**ROLE OF THE COMPTROLLER IN THE ARMY** is growing. The skilled analyst of fiscal policies is being viewed as a key man in keeping budget requests in trim and in putting into operation industrial funds and a financial property accounting program.

**GALVANIZED SHEET BOOKINGS** are moving into September with anticipated strong demand in that month though bookings thus far are not heavy. Increased capacity seems to have made no dent in demand for this product.

**A FOIL CHECKING DEVICE** operated by vacuum is being used to check 18 dimensions at once on jet engine blades. Accuracy is to 0.001 in. Readings are taken from tubes in which different levels of colored liquids represent thicknesses, angular displacement.

**STEEL FIRMS ARE STEPPING UP** their interest and participation in the plastics industry. Reason: Last year plastics displaced between 150,000 and 200,000 tons of steel, estimates by research department of one steel company have shown.

**AUTOMATION CONTINUES TO MAKE STEADY PROGRESS** in many fields. One producer of office business machines has an automated line for drilling typewriter frames. Starting from a loading point, frames are drilled, washed, return for unloading.

**A NEW METHOD FOR SELECTING MATERIALS** for pump and turbine water blades has resulted from recent cavitation studies. Cavitation resistance of metals is determined by the metal's ability to resist surface breakdown under the test.

**FIRE RESISTANT PLASTICS**, in the form of corrugated sheet reinforced with glass fiber, are finding many uses in the building trades. Fact that the material has recently been approved for exterior use on an office building and a school indicates growing acceptance.

**SOME STEEL EXECUTIVES** look for a business dip in July followed by slow rise in demand. Fabricator vacation shutdowns are given as a chief reason. Consumers of large tonnages are holding July receipts to a minimum.

# CMP

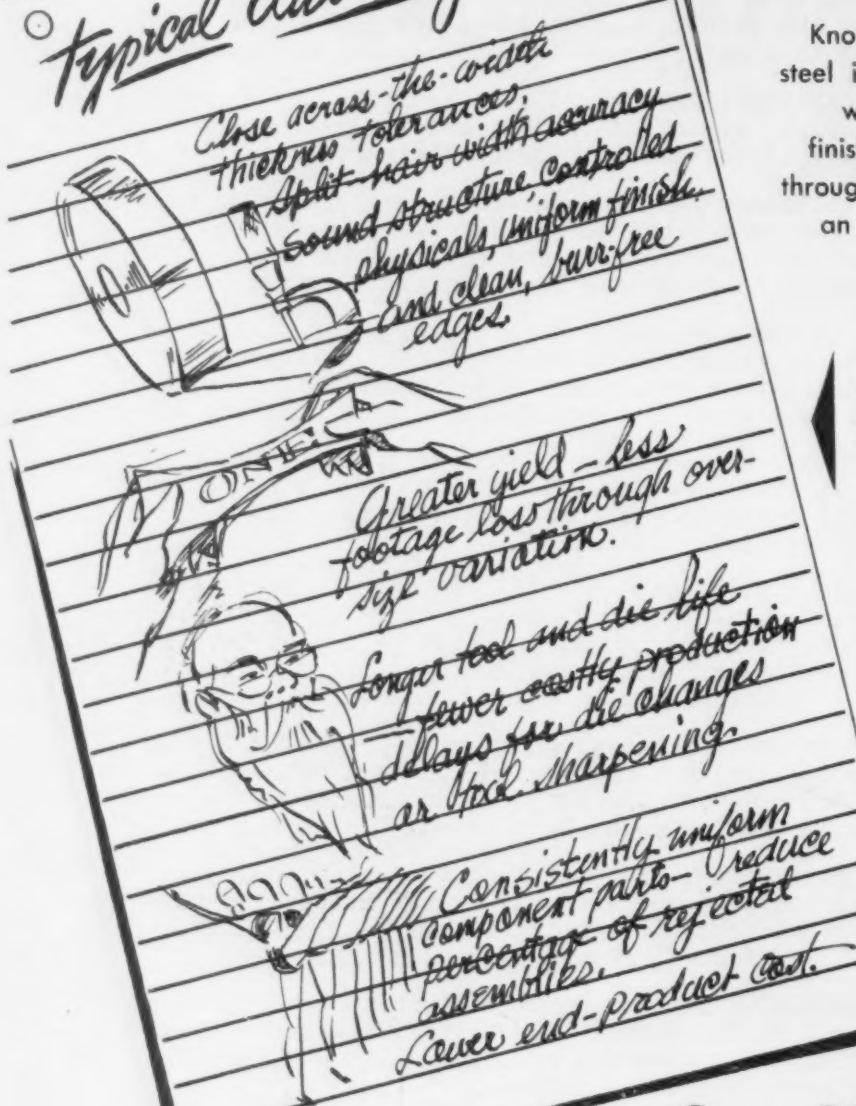
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# STOCKPILING: Delayed by False Start

Refusal to buy lead forced price cut . . . Had set ceilings . . . Now buy "at market price" . . . Zinc, lead regain lost strength . . . Prices may rise—By R. L. Hatschek.

Lead market last week turned a few flip-flops before the long-term stockpiling program was straightened out. And sellers of zinc went through some emotional flip-flops in sympathy. But the government came through and "clarified" everything, saying finally that they'd buy at the going price.

Here's how it happened:

Markets for both metals were out on their feet, with the low point coming in February. At that time Prime Western zinc price was 9.75¢ per lb, common grade lead price was 12.50¢. Nobody seemed to want metal and producer stocks, particularly slab zinc, were too high—as they still are.

For latest developments in lead and zinc markets see page 246

The mining industry and congressmen from mining states were clamoring for government aid of some kind. Tariff hikes, import restrictions, subsidies and renewed stockpiling were all called for. The first two are still under consideration in Washington.

Prices edged upward in anticipation of U. S. action. And late in March the White House issued to Office of Defense Mobilization a directive calling for increased long-term stockpiling. This was to include metals for which goals had already been met. And it was largely designed as a booster for hard-pressed miners.

Immediate effect was to strengthen the markets. Prices rose and consumers, realizing the bottom was past, came in for better tonnages. As May ended, ODM

was expected to direct General Services Administration to start buying. So prices went up some more and business continued at a brisk pace.

## Industry Shocked

Order was issued in mid-June and GSA invited industry to offer lead and zinc. Producers jumped in, offering tonnages of both at current market prices of 14.25¢ for lead and 11.50¢ for zinc.

But GSA refused to accept lead "at the price quoted" and accepted considerably less zinc than was offered.

Amazement, shock, puzzlement and anger were immediate industry reactions. Purpose of the program was assumed to be support of a sagging strategic industry. Why the refusal—without even offering a counter bid?

Consumer demand for lead dropped immediately as buyers decided to wait and see what would happen to prices. Zinc buyers also hesitated.

## Had Set Ceilings

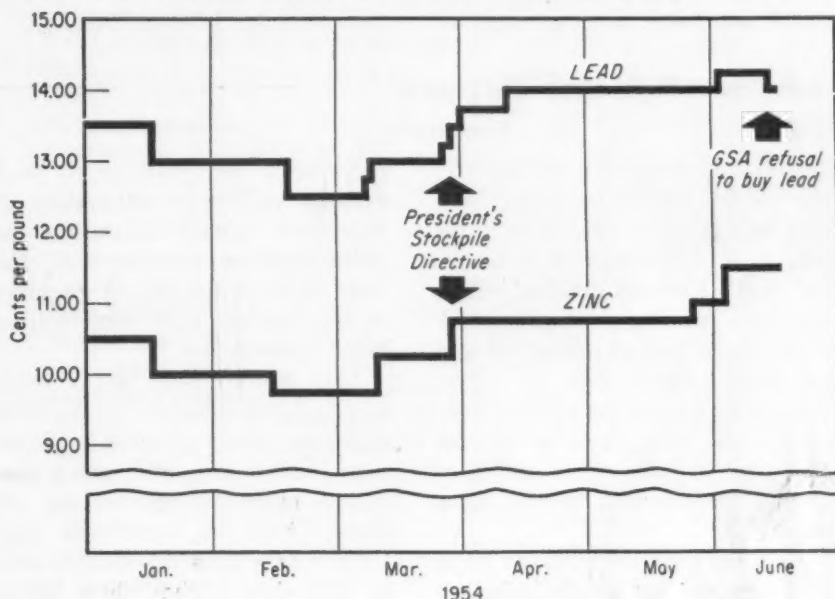
Then lead was offered at a lower price, 14.00¢. And again it was refused. This was the final killing blow to lead demand.

Finally recognizing the turmoil that had been created, ODM last Wednesday quickly backtracked, issuing this brief statement:

"The Office of Defense Mobilization today authorized the General Services Administration to make its purchases of lead and zinc for the long-term stockpile objectives at the market price. The initial directive established ceiling prices. When the GSA went into the market to purchase lead, it was already above the ceiling price. The new instructions are designed to correct this situation."

Why put ceilings on metals that

## How Prices React to Washington





## STEEL: Settlement Boils Price Kettle

**New labor settlement will boost steel price pressure . . . Any cost increase nicks profit margin . . . New competition makes price rise a sticky issue—By J. B. Delaney.**

Regardless of its nature, the steel labor settlement will exert upward pressure on steel prices.

Higher labor costs—whether in the form of a straight wage increase or expanded pension and insurance programs—cut the steel producer's profit margin accordingly.

For the moment, at least, steel producers are conscious of the highly competitive market situation and customer resistance to higher prices.

But price boosts to cover cost increases are certain to follow—if not immediately, then later. It was recalled that under Office of Price Stabilization the steel industry was forced to absorb at least part of higher labor costs due to the across-the-board nature of the OPS price concession.

It was not until last year, when price controls were lifted, that the steel price structure was brought into line.

Steel producers figure that for every penny wages rise, prices must be boosted 40¢ per ton. This figure includes resultant higher cost of materials purchased. Thus a wage cost increase of 5 to 8 cents would call for a price advance of

\$2 to \$3 per ton. Last year, the 8½¢ wage settlement was followed by a \$4-per-ton price boost.

Industry leaders have emphasized repeatedly they do not want to increase prices, and probably will lean over backwards to avoid doing so. But they also have said that if they are forced into significantly higher labor costs the only way to cover them is through increased prices.

When they talk about holding the price line, steel executives are merely facing up to realities. Actually, base price and extra increases of last year have been partially offset by freight absorption and extra adjustments as well as customer switching sizes and grades to avoid extra charges.

Steel producers have other good reasons to avoid price rises, mainly competition from other metals—notably aluminum—and substitute materials, such as plastics.

But whether they can hold the line on prices depends on the reasonableness of the labor settlement. The answer to that question may come this week from the International Wage Policy Committee of the United Steel Workers, which was scheduled to meet Tuesday.



**SPIRIT OF '54.** Did Fairless, McDonald smiles forecast agreement?

Despite official denials, indications were that David J. McDonald, union president, summoned the policy group for the purpose of presenting a concrete proposal by U. S. Steel Corp. That proposal was said to reject the demand for a wage increase and limit concessions to pensions and social insurance.

But early this week union position stiffened, dulling optimism for an early agreement. Tough position of Mr. McDonald indicated bargainers were not yet out of the woods.

The assumption is that if the U. S. Steel proposal is accepted by the union, the resultant modest cost increase could be absorbed for the time being at least by the steel companies.

## Special Report

*Continued*

are already down and all but out? Part of the long-range stockpiling idea was to build up strategic reserves at advantageous prices—and that's how the original directive was worded, ordering GSA to purchase lead at under 14¢ and zinc with a 13¢ ceiling.

Security provisions of the stockpiling law were cited as reason for keeping both price and tonnage a secret—with turmoil as a result.

Cennings seem to have been quite arbitrary and not precisely in line

with what was believed to be a primary motive of stockpiling at this time, namely bolstering the ailing mining industry. At the time of the White House directive in late March, both were selling below these limits.

Now that the going market price has been established as the GSA purchase price, demand is snapping back to the level which prevailed prior to GSA's lead refusal. And the knowledge that ODM was willing to stockpile zinc at 13¢—1.5¢ higher than initial

offers and sales—has given zinc a good shot in the arm. But smelter stocks standing at about 209,000 tons will slow the reaction.

Last Thursday GSA asked producers to make new offers of both lead and zinc. Request was speedily complied with and the "new look" stockpiling program finally got under way after its false start.

Chances now are that any price changes will be upward. And consumers have the same feeling, placing new orders at a flat price rather than an average basis.

## BARGAINING: Predict A Peaceful Year

**AMA conference sees no all-out union demands . . . Reports 5¢ top wage boost on most '54 contracts . . . Settlement on local levels . . . Hear GAW case history.**

The year 1954 will probably see a halt in organized labor's all-out push toward "pie-in-the-sky" objectives that has marked industry-wide collective bargaining during the war boom economy of 1951-53. This was the gist of American Management Assn. findings presented in a report to some 800 labor relations executives at a conference in New York.

AMA's labor experts foresee a relatively peaceful year, a prediction already affirmed by early contract settlements, some of which reveal no money increases at all. In many cases settlements for 5¢ a hour and under are being made.

Management men see a shift from the steep wage boosts and heavy fringe hikes of the past 3 years stemming from three major changes in the labor-management picture.

### Have New Leaders

First, leadership of big labor has changed almost completely in the last three years. Labor's new leaders have hardly consolidated their positions as yet and have by no means the clear-cut patterns of authority of their famous predecessors.

Secondly, the Eisenhower administration has established a clear-cut policy of non-interference in the affairs of unions and industry. Labor and management must now settle their own problems.

### Bargain On The Downbeat

Third change is in the nation's economic climate. The transition from the Korean boom to a peacetime economy has brought a sharp halt to the inflationary spiral during which the collective bargaining question was not "Shall a wage increase be granted?" but rather "How much shall the wage increase be?"

Although pattern bargaining still holds sway in large industries cov-

ered by the major unions, AMA notes greater emphasis on negotiations at the local level, with smaller companies negotiating individually with union locals as to what they can afford to offer at the bargaining table.

The Guaranteed Annual Wage figured prominently on the AMA conference agenda. AMA report stated that 1955 may well be the target year for UAW-CIO to push for GAW in negotiations as their major contracts are closed till then. IUE and USW are pushing for GAW in this year's negotiations.

### Review Case History

Final outcome of the GAW issue will depend jointly on the state of nation's economy and big-union negotiations with basic industries. AMA's labor relations experts feel that although many companies are finding GAW among the demands they are asked to consider at the

### Recipe for Good Relations

The following formula for improving relations between labor and management or between supervisor and worker is set up as a guide for group conference leaders by Weirton Steel Co.'s Education and Training Dept.:

- Have self control.
- Understand the viewpoint of others.
- Make others' interests your own.
- Admit it when you're wrong.
- Never make promises you can't keep.
- Reason—don't argue.
- Explain thoroughly.
- Lead—don't drive.
- Avoid snap judgement.
- Take care of the little things.
- Inform people of changes affecting them.
- Observe and listen with understanding.
- Never criticize in public.
- Stress rewards.

bargaining table this year, it is doubtful that GAW will be a major factor in settlements.

An interesting review of his company's experience in bargaining a GAW contract was given by Thomas T. Heney, vice-president and secretary of The National Sugar Refining Co.

Mr. Heney stated that the nature of his firm's GAW contract was governed by the seasonal pattern of the refined sugar business which can provide a 6-day working week in the summer season but only a 3 or 4-day week in the winter months.

### Can't Cover All Risks

National Sugar's GAW contract provides, Mr. Heney stated, "that the owners of the machines undertake to protect those who operate them against the employment hazards of uneven scheduling, fluctuation in the demand or distribution of the product, and against other conditions over which the management may exercise some degree of control.

"The contract provides no guarantee against risks beyond the control of management to which both owners and workers alike are exposed. Unemployment from such causes becomes the problem of the community as a whole."

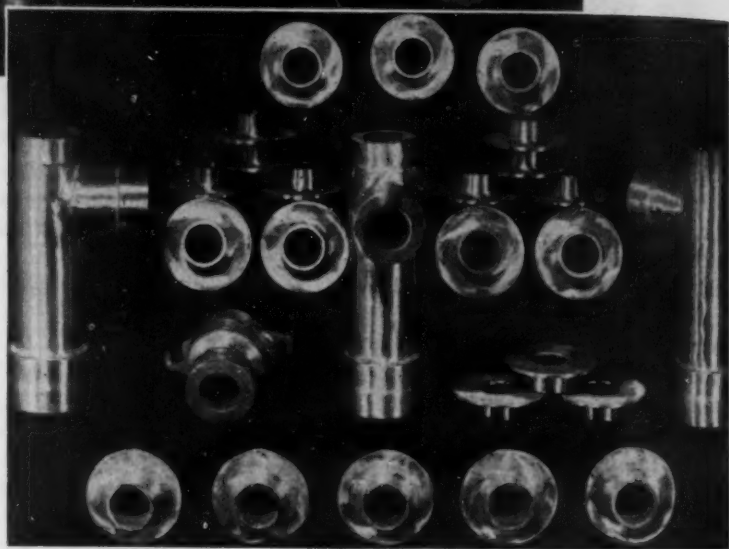
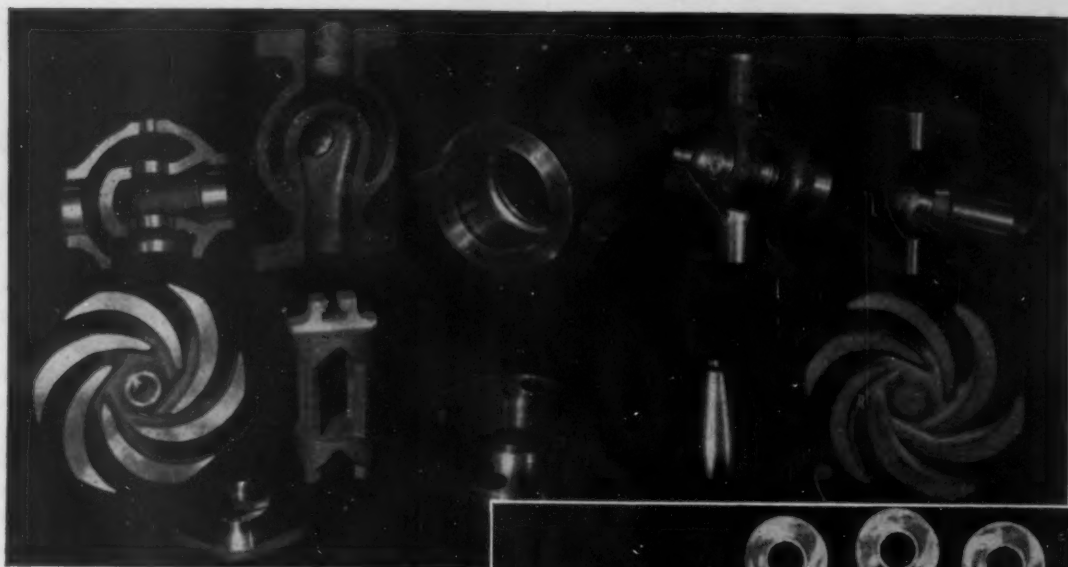
National Sugar's current contract guarantees the opportunity for an employee to work at least 2000 hours during the calendar year 1954, or pay in lieu thereof.

### NLRB Rules Slowdowns Unfair

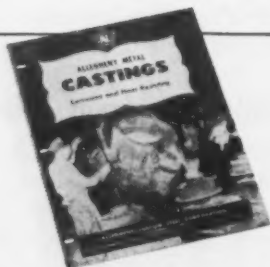
National Labor Relations Board, reversing earlier decisions, has ruled that union-sponsored work slowdowns, partial strikes and refusals to work overtime are unfair labor practices under the Taft-Hartley Act.

The board for the first time issued a "cease and desist" order directing a union, Textile Workers Union of America (CIO) to stop using "harassing" tactics during contract negotiation.

It ruled that such tactics, employed against Personal Products Corp., Chicago, constitute unlawful "bad faith" in bargaining.



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## LEGISLATION: How Ike's Doing

Of two dozen major bills affecting business and industry only five have passed, two were killed . . . Tax bill revision passage expected soon—By N. R. Regeimbal.

Fate of several phases of President Eisenhower's legislative program vital to business hinges on the ability of Congress to accelerate its pace in the closing weeks of this session.

An IRON AGE survey of two dozen major bills and programs affecting business shows that in mid-June only five of them were adopted, two killed, and conference committees of the two chambers were wrangling out their differences on three others. The rest, for the most part, were low on the ladder leading to congressional action.

### What's Been Passed

The pace, stepped up after the President's recent fighting television speech, will have to be accelerated even further if action is going to be taken on the rest before adjournment. Republican congressional leaders have set July 31 as a target date for adjournment, but most observers believe it will be closer to mid-August before the lawmakers can wind up their business and go home to mend political fences.

So far, the second session of the 83rd Congress lists as its accomplishments passage of the St. Lawrence seaway project; \$2 billion highways program, and the \$1 billion cut in excise taxes.

### Still Wait on Tax Bill

On the debit side, as far as the President's program is concerned, the legislators have turned back amendments to the Taft-Hartley labor law and virtually forced the President to accept a one-year extension of the old Reciprocal Trade Act in place of his liberalized 3-year trade-tariff program.

Vital phases of the Eisenhower program on which final action must still be taken include liberalization of the Social Security pro-

gram; continuation of the mutual aid program; most of the annual appropriation bills; a revamp of the housing and health laws, and an overhaul of the tax code.

### Wrangles Coming Up

Still waiting initial chamber action are bills giving government and industry broad security powers to oust subversives; a measure to curb government competition with private business, and a measure to loosen the government's monopoly over atomic energy to permit its development for peaceful purposes by private industry.

Increased postal rates and extension of the unemployment com-

pensation laws were still languishing in committees last week.

Debate on the overhauled tax code, already passed by the House, is expected to tie up the Senate for at least 2 weeks more. Social Security revisions are believed to be a shoo-in, but will also eat up some of the time remaining in the session.

### Propose Highway Finance Agency

Most ambitious of recent congressional proposals to aid state and local governments in road construction is the Highway Finance Corp. plan introduced by Rep. Tom Steed, D., Okla., in House Banking Committee.

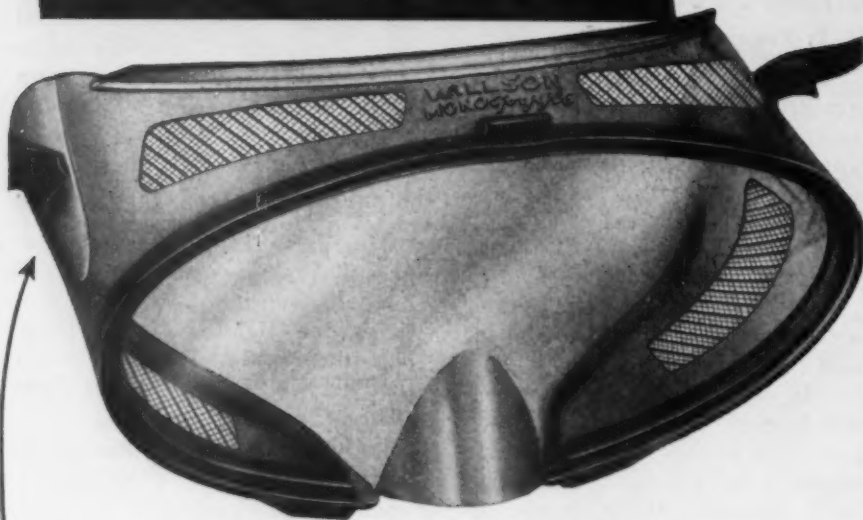
Powers of the proposed corporation capitalized at \$100 million would include authority to buy state, city, or county bonds to finance the building or rebuilding of toll-free roads, as well as securities to aid in paying for toll-road projects, including bridges, tunnels.

## Scoreboard on Ike's Legislative Program

### Status of Major Bills Affecting Business as of June 22, 1954

BILL	Reported in House	Passed House	Reported in Senate	Passed Senate	Enacted
<b>APPROPRIATIONS</b>					
Defense.....	X	X	X	X	Conference
Mutual Security.....	.....	.....	.....	.....	.....
Labor.....	X	X	.....	.....	.....
Civil Functions.....	X	X	X	X	Conference
Interior.....	X	X	X	X	Conference
Treas.-Post Office.....	X	X	X	X	X
<b>TAXES-REVENUE-SPENDING</b>					
Excise Tax Reduction.....	X	X	X	X	X
Tax Revision.....	X	X	X	.....	.....
Social Security.....	X	X	.....	.....	.....
Unemployment Comp.....	.....	.....	.....	.....	.....
Postal Rate Increase.....	.....	.....	.....	.....	.....
Debt-Limit Increase.....	X	X	.....	.....	.....
<b>GENERAL</b>					
Atomic Energy Control.....	.....	.....	.....	.....	.....
St. Lawrence Seaway.....	X	X	X	X	X
Bus. and Manuf. Census.....	X	X	X	X	X
Taft-Hartley Revisions.....	.....	.....	X	Killed	.....
Housing Program.....	X	X	X	X	Conference
Highway Program.....	X	X	X	X	X
Reciprocal Trade.....	X	X	X	.....	.....
Shipbuilding Program.....	.....	.....	X	X	.....
Customs Simplification.....	X	X	.....	.....	.....
Govt. Competition.....	.....	.....	.....	.....	.....
Industrial Security.....	.....	.....	X	.....	.....
Min. Wage Increase.....	.....	.....	.....	.....	Killed

## IMPROVED No. 90A Series WILLSON MonoGoggle



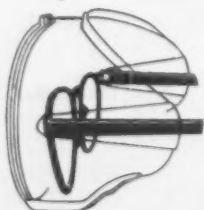
### Wider, Deeper Frame Gives Greater Clearance Over Spectacles

We've taken the popular Willson MonoGoggle® design and made it with a deeper and wider pliable, transparent *vinyl* frame with grooves molded into the sides for extra roominess over glasses. It provides protection against light impact hazards on such operations as spot welding, buffing, wood working and chemical handling.

Workers who wear prescription glasses—even the new, big plastic frames—will welcome its extra roominess. Transparent frame is tinted light green to keep out glare, but admits adequate side light. Clear or green plastic lenses are securely held in place by a deep channel and closed "tab pocket".

Ask your Willson distributor to show you the new No. 90A Series MonoGoggles, available with either direct or indirect ventilated frames or non-ventilated styles. Or write for bulletin.

Side view shows molded-in grooves in sides of frame provide ample clearance for spectacle temples—removes interference with eye glass comfort.



WILLSON PRODUCTS, INC., 231 Washington St., Reading, Pa.

## Expansion

### Machinery:

**Lease Air Force presses to private industry.**

First of four mammoth forging presses to be leased by the Air Force to industry will be put into operation at the Cleveland plant of the Aluminum Co. of America late this year.

The Air Force told THE IRON AGE that the date will be announced in July. Air Force will also present a progress report on the full \$210 million heavy press program.

Installed at Alcoa plant will be one of two 50,000-ton units authorized in the program. Later, the plant will also get one of two 35,000-ton units.

Six extrusion presses, from 8,000 to 12,000 tons, are also being installed at various plants.

Heavy presses, developed by the Germans during World War II, will be used to form aluminum and magnesium and later titanium. The monsters will speed output and lower production costs by forming larger parts, thereby eliminating fabrication of smaller parts produced on present equipment.

Russia, which "liberated" a 33,000-ton press and plans for a 50,000-ton unit from the Germans near the end of World War II, is in a race with the U. S. to develop this new production weapon. So far, the Air Force believes, the U. S. is holding its own.

### Accept Grain Bin Bids

Agriculture Dept. is accepting bids, postmarked as late as June 25, on prefabricated storage structures to house 100 million bu of surplus grain, principally corn.

Bins will be bought, knocked down, on the basis of bids quoting prices f.o.b. manufacturer's shipping point. The department will take offers on standard metal bins with a capacity of 3,250 bu each; metal or wood bins, capacity of 4,000 to 12,000 bu each; and flat-type structures with a capacity of 40,000 bu.

Officials are asking early delivery on these units—as many as possible by July 31.

## Hydraulics:

Valve "directs" milling cutter  
... Speeds job 84 pct.

A tooling application cutting a 1 hour and 12 minute job down to 11 minutes is reported by Consolidated Vultee Aircraft Corp. at San Diego, Calif.

This time saving of 84 pct is achieved by fitting a Morey profile miller with a True-Trace hydraulic valve. Valve carries a stylus with which the machine operator traces a template. Hydraulic pressure

then translates stylus motion to the work table. Speed is achieved largely by elimination of pre-sawing.

Operator has to apply only 3 to 5 oz force on the stylus.

Spindle speed is 1800 rpm and the tool is a two-lip high-speed end mill which finishes to 80 to 100 microinches RMS. This cuts 1-in. thick 75S-T at a feed of 40 in. per minute.

## Computer:

Takes human error out of  
punch press operation.

An electronic digital computer is the operator of a punch press in a development by General Electric Co. Actually the automatic machine is a byproduct of work done for the Army Signal Corps on an automatic components assembly system.

Computer gets data on number, size and location of holes to be punched from a perforated card. It then feeds directions to the punch press shown in the photographs in the right-hand column.

Signal Corps suggests that civilian product manufacturers might be interested in this automation development, which is described as

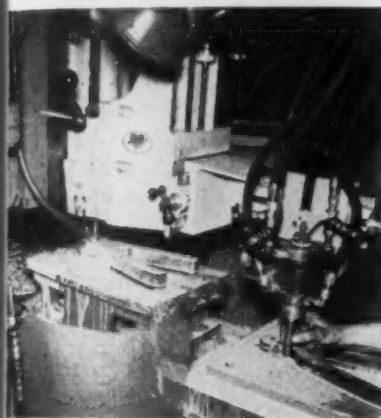


**AUTOMATIC** punch press cuts human error. Standing in front of the electronic "operator" is Frank M. Rives, GE supervisor of the development.

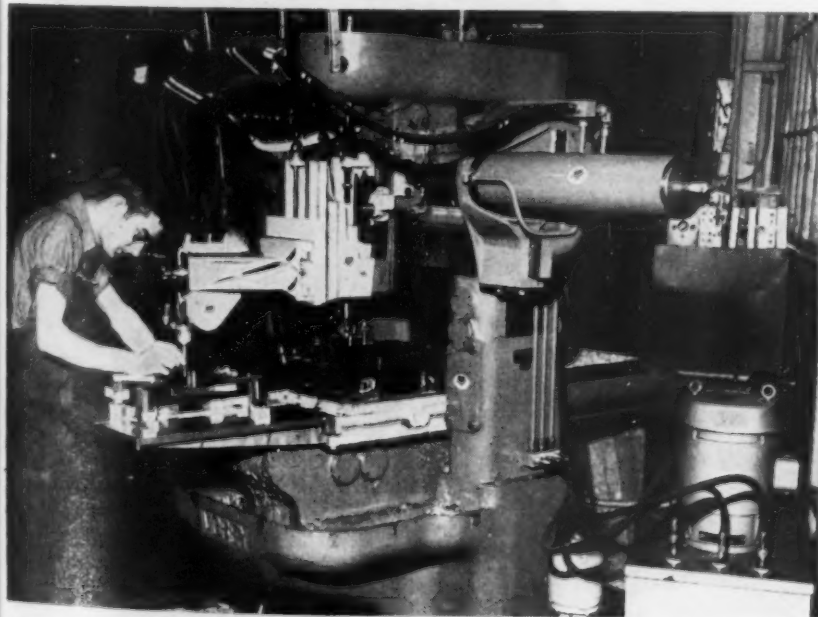
the forerunner to a complete automatic assembly machine.

Methods used in automation of the punch press can also be applied to other operations such as drilling, riveting, stapling, electrical testing and others.

Application of the computer to this punch press is designed to eliminate the factor of human error. How much production rate is speeded was not indicated by either GE or the Signal Corps.



**STYLUS** tracing pattern (right) guides milling of rough-sawn aluminum blank. Convair no longer pre-cuts parts, saving more time.



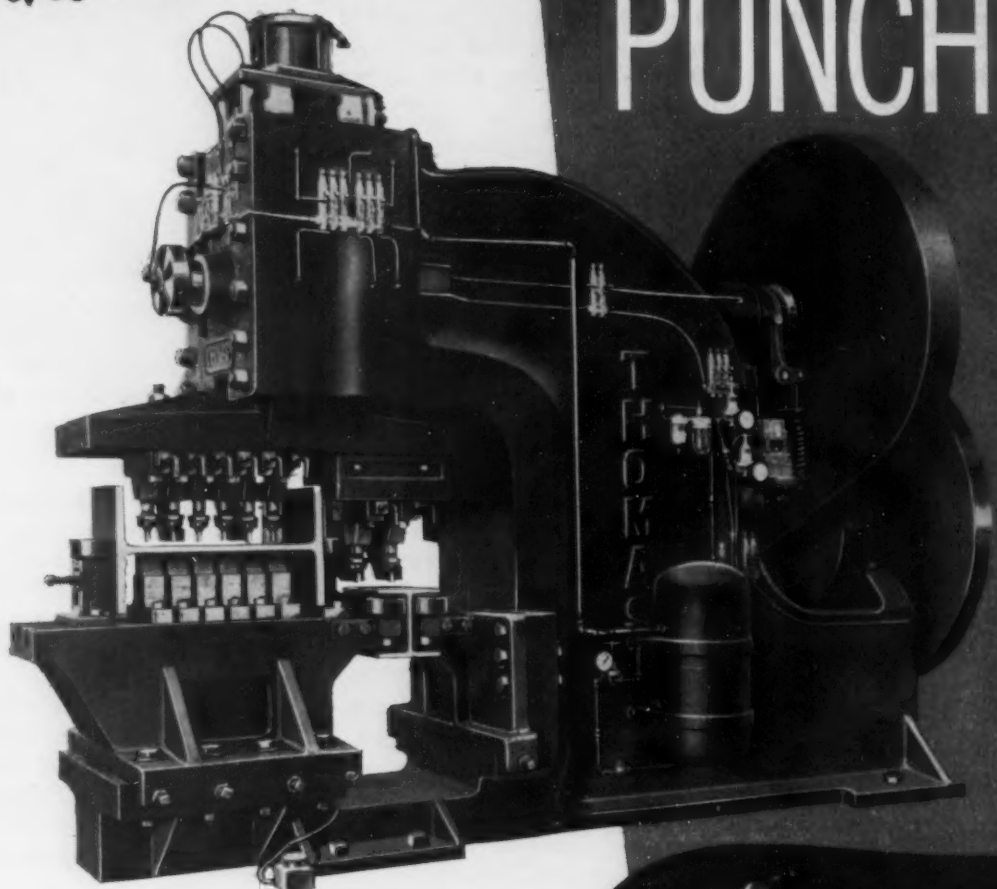
**HYDRAULIC CONTROL** valve cuts job time from 72 minutes to 11 minutes.



**CHECKING** accuracy of the electronic "workman's" effort is GE's John Rupper. Mr. Rives looks on.



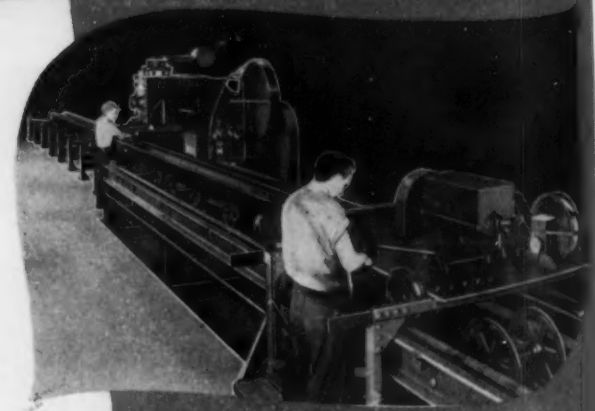
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*for the most modern in* **BEAM  
PUNCHES**



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**Punches • Shears • Presses • Benders • Spacing Tables**

## GALVANIZED: Showing New Strength

Shipments trail last year's pace, but galvanized is doing better than other grades . . . Mills booking solid through August . . . Extend some deliveries—By K. W. Bennett.

What's happening to galvanized sheet?

After a lull late in 1953 and early this year it suddenly started moving up fast, particularly in comparison to other steel grades. Though tonnages can be obtained on 6-weeks delivery, mills are booking solid through July as well as the traditionally slower August vacation period. Some promised deliveries have been extended into September without strong customer complaint.

Mill men find their customer's inventories of galvanized sheet are, without exception, very low. Scarcity of a strike or trouble in Indochina has been practically nonexistent.

### Spotty Inventory Buildup

Jobbers aren't quite so sanguine, however. They report business declines from last year ranging from 10 to 50 pct which should mean a pileup of galvanized sheet at this level. Yet most jobbers feel their present stock, if a little heavy, is not excessive.

There is some concentration of orders in 20 gage and the lighter gages. One jobber reported an inventory he felt was a little high. Yet in 20 and 22 gage stock he's low, believes he has lost some business in the past 30 days because of his reduced stock in these gages.

This indicates that any inventory buildup at the jobber level is spotty, confined to slower moving grades, and is often in hot-dipped material rather than continuous. Since total galvanized shipments for January-April '54 are only 8.6 pct below the like 1953 period, the decline in jobber business can't have been too severe.

### Small But Growing

Though galvanized sales are spread across a wide customer

range, at least three reasons are pointed out as unexpected sources of strength in galvanized demand. New home building, though some distributors will argue this point, were higher than expected in late December and early January. Second, government grain bin program is still moving strongly. Third, farm demand wasn't expected to come in with the strength that it has shown.

Statistics bear out the pleased expressions most salesmen in the galvanized sheet department are wearing.

Galvanized sheet, including both continuous and cut sheet lengths, represents a small portion of the total steel rolled in the U. S. In January, 1953, galvanized sheet tonnage represented only 2.8 pct of total steel shipments. By July this figure had slipped to 2.7 pct of total shipments to that date. At

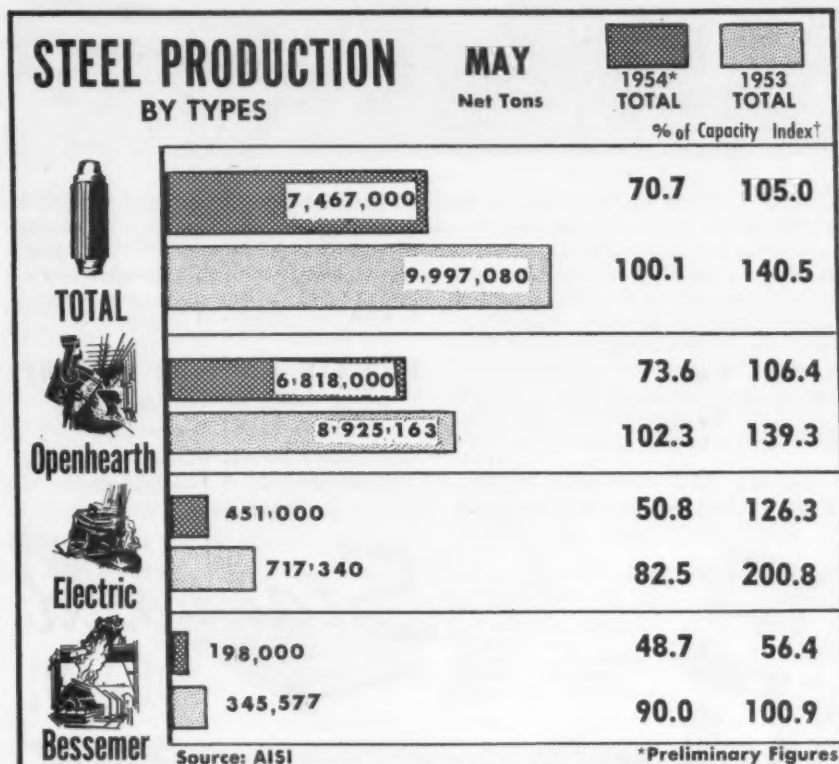
this point, galvanized dug in its heels, began to move up in what most steelmen considered a falling market.

By October, galvanized accounted for 2.8 pct of total 10-month shipments. In December, though galvanized shipments were down, as a percentage of total steel shipments they were up to 2.9 pct, showing that shipments or other steel grades were off more than galvanized. In January of this year they hit 3 pct.

Galvanized shipments began to climb again in March and the percentage for the first quarter increased to 3.1 pct. In April they rose to 3.3 pct for the 4-month period.

### Expect to Hold Gain

Comparing present galvanized sheet shipments with same period last year is somewhat more revealing. In January of 1954, galvanized shipments amounted to 83.9 pct of January 1953 shipments. This wouldn't sound particularly hopeful. But in February the ratio was up to 91.2 pct of February 1953, shipments. In March it fell back slightly to 87.8 pct. In April the



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ed bearings expressly designed for severe foundry service — to suit a wide variety of foundry applications. Whatever your specific need, Standard is qualified by experience and facilities to recommend and furnish the right type of conveyors.

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## —Marketing—

grade erupted, reached 102.7 pct of its April 1953, level.

A substantial cross-section of mill men feel that May and June totals will equal the April figure.

Continuous vs hot-dipped galvanized ratio has continued to slide in favor of continuous, as was expected. Though hot dipped-continuous sales were estimated at 50-50 in 1953, it is now expected that continuous galvanized sheet will lionize the market in at least 5 years. Strong advocates of continuous believe that the change will be complete in a year.

On the other hand, for heavy gage sheet, hot dip is preferred by many customers ranging from small job sheet metal shops which like to work the softer material, to drainage and culvert producers who need heavy stock.

The volume consumer continues to switch to continuous, and one mill, Inland Steel at Chicago, now produces 100 pct continuous, will no longer market the hot-dipped cut sheet.

Nobody is projecting galvanized demand beyond July. Mills now booking galvanized sheet for September delivery remember the cancellations of latter 1953. But mills are booked for July and August.

## Point of Order

In following up its story, "U. S. Machinery Sent to Red Steel Mill" (May 6, 1954, p. 87) THE IRON AGE learned that although materials from the West were used by the Reds to build the Lenin Steelworks in Bulgaria, the blast furnaces and sheet mill mentioned in the article did not come from the French USINOR and SOLLAC firms as was stated.

As was stated in the original story none of the firms mentioned have been trading with Communist countries. In all cases the equipment and materials referred to arrived at the Bulgarian steelworks in a roundabout manner from merchants, not from the original producers who had no knowledge and no control over what happened to their products after they were sold to legitimate customers.



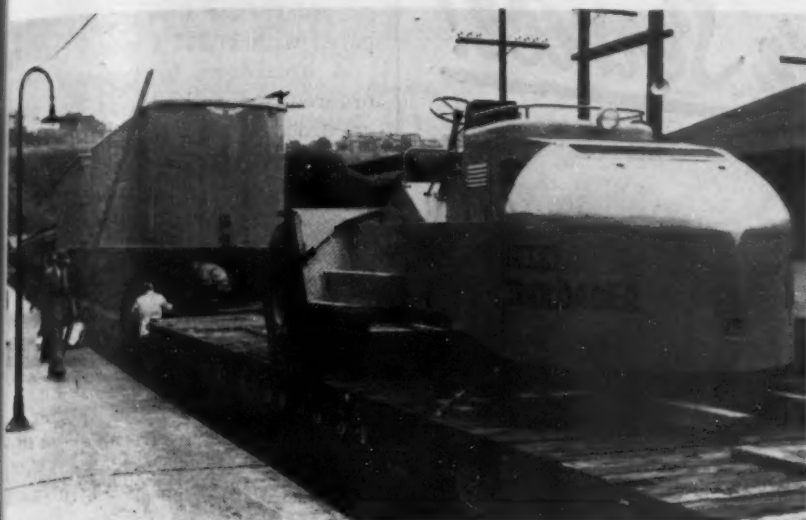


EXHIBIT by New York Central Railroad shows a pair of standard-size trailers atop piggy-back flat car. Ross Trailoader puts them there.

## PIGGY-BACK: Stopped at Start

**ICC blocks railroads' plan to haul truck trailers on flat cars  
... Suspend tariffs day before service was to start ... N. Y.  
Central working with truckers can go ahead**

Piggy-back plans of six railroads hit a roadblock last week that may keep them stalled until January of next year.

Interstate Commerce Commission on Tuesday made public an order suspending tariffs proposed by the railroads for hauling truck trailers on flat cars. Suspension came one day before service was to have been inaugurated and is to remain in effect until Jan. 15, 1955—unless the commission terminates its order before then.

The tariff suspension followed protests by truckers and terminal operators who charged the roads were seeking to compete with their own rail car service with a "hybrid rail-motor device."

The roads would also be in direct competition with truckers, since they planned to pick up loads in trucks either owned or leased by them.

### Won't Change Rate

The suspension may give the New York Central a head start with a somewhat different piggy-back system it plans to place in service this summer. The Central plans to haul the truck trailers for the truckers on the truckers' bills of lading. Cen-

tral's contract would be with the trucker, not with the shipper.

A spokesman for the road said it contemplates filing no new rates in connection with the program.

The Central has on display at Weehawken, N. J., a specially designed 75-ft flat car of the type it will use. Mounted on it are two standard highway trailers. Also exhibited is the Ross Trailoader, a specially adapted hydraulic lift truck used to load and unload the trailers.

### Will Discourage Improvements

Railroads affected by the tariff suspension were the Pennsylvania; Baltimore & Ohio; Erie; Delaware, Lackawanna, & Western; New York, Chicago & St. Louis; and the Wash.

The railroads immediately urged that the suspension be set aside. They said the proposed piggy-back service "represents the most important change in method of railroad transportation in many years ... has captured the imagination of the public."

The railroads said the suspension will, in addition to delaying their proposed piggy-back service, discourage attempts by them to furnish

new types of improved service for the benefit of the public.

"Flat cars have been equipped; trailers have been acquired; terminal facilities have been provided; personnel have been delegated; and all plans perfected to inaugurate the service."

### Idles Equipment

The railroads also pointed out in their petition that "the service, without commission objection, is now being performed by a number of railroads under similar tariffs."

The Pennsylvania Railroad said that equipment worth more than \$1,270,000 which it has converted for piggy-back operations will stand idle pending the Interstate Commerce Commission's decision.

ICC will begin a hearing of the entire question of piggy-back service on June 28. Date of the hearing was scheduled some time before ICC brought out its suspension order.

### May Help Carbuilders

It is expected that delay caused by the suspension will temporarily slow railroad plans to order the new type equipment.

Plans to start piggy-back service on a limited scale have been a factor in railroads' failure to order conventional freight cars. Widespread use of the piggy-back cars would lessen demand for conventional cars, and the roads naturally want to purchase the kind of equipment that will be needed.

Result: Hoped for pickup for carbuilders may still be around the corner.

### Freight Car Deliveries Down

Lagging freight car deliveries plunged further in May, dropping to 3173 compared with 4038 in April and 6500 a year earlier, the Assn. of American Railroads reports.

Orders for only 1071 new domestic freight cars were placed by the

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## Transportation

railroads in May. Backlog of cars on order June 1 was 15,615 compared with 17,817 a month earlier.

A breakdown by types of cars ordered and delivered in May and on order as of June 1 follows:

	May— Ordered	Delivered June 1	On Order June 1
Box—Plain .....	—	913	5,768
Box—Auto .....	—	—	1,000
Flat .....	101	195	811
Gondola .....	35	146	726
Hopper .....	350	470	1,855
Cov. Hopper .....	175	352	720
Refr. ....	290	605	3,574
Stock .....	—	—	—
Tank .....	198	476	2,126
Caboose .....	—	4	81
Other .....	12	12	264
<b>TOTAL</b> .....	<b>1,071</b>	<b>3,173</b>	<b>15,615</b>
Car Builders .....	758	2,028	5,942
Railroad and private car line shops .....	313	1,145	10,573

## Railroads:

**Class I April earnings 50  
pct below April 1953.**

The nation's Class 1 railroads continued to lose revenue in April as net income for the month dropped about 50 pct below the same month a year ago, Assn. of American Railroads reports.

Income for the first 4 months of 1954 is estimated at \$128 million, compared with \$262 for the same period a year ago. In the 12 months ended Apr. 30, the railroad rate of return was estimated at 3.63 pct, compared with 4.37 pct for the year ended April 1953.

Of the Class 1 railroads which failed to earn interest and rentals in the first 4 months of 1954, 20 were in the eastern district, 3 in the southern region and 14 in the western area.

## RRs Cut Eastern Scrap Rates

Reduced rail rates on some scrap shipments go into effect July 20. Eastern railroads are filing new tariffs on iron and steel scrap that quote rates about 15 pct lower than those now in effect. New rates apply to shipments of 80,000 pounds or more. Negotiations to lower rates in other sections of the U. S. are now in progress.

New lower rates are expected to stimulate the flow of scrap to the mills. On shipments from rail points in New England to Pittsburgh, for example, the lower rates will spell out a saving of about \$100 per car.

# FOUNDRIES: Attract, Aid Students

**Industry's educational foundation pays off . . . Seven-year program boosted number of teachers, students, tripled facilities . . . Hikes personnel quality—By R. M. Lorz.**

Slow down in castings sales this year hasn't affected the foundry industry's talent hunt. Active recruiting of engineering graduates this spring is, if anything, a little more vigorous than in 1953.

According to a recent survey covering more than 900 firms, young engineers will find the welcome mat out at four out of five foundries. While foundries can't compete with some of the highest paying industries, starting salaries in most areas will be around \$375 to \$400 per month.

Interest in specific talents is mainly confined to mechanical, metallurgical and industrial engineering graduates. Biggest demand by far is for mechanical graduates because there are only a handful of metallurgical engineers available to meet demand from industry in general. Foundry executives interviewed by THE IRON AGE said they generally employed at least three mechanical engineers to every one metallurgical man.

## Founders Woo Students

Since the demand for fresh blood is an established fact, only question remaining to be answered concerns availability of new men. A few years ago the answer probably would have been in the negative but conditions have changed.

This June founders expect to attract at least 200 top-notch graduates, maybe more. The youthful graduate's interest in cast metals is the result of a well-organized program set up in 1947.

At that time all of the important trade associations connected with the industry decided to get out and do something about interesting young engineering students in foundry practice.

Formation of the Foundry Educational Foundation has produced some wonderful gains. In the 7 years it has been in existence F.E.F. has established working re-

lationships with 14 of the best schools in the country. In that short length of time value of teaching facilities in college and university laboratories has jumped from \$830,000 in 1947, to \$2,033,000 in 1954. Number of full-time foundry teachers has also increased from 11 to 55 in the same period. Engineering students who elect to take a foundry option in addition to basic engineering courses are getting a big break these days because they now have over 100 foundry courses to choose from.

These changes didn't occur overnight. They have been brought about principally through the efforts of F.E.F.'s regional industry advisory committees who have worked hard at establishing firm relationships with schools.

## Launch Scholarship Plan

Ed Walsh, executive director of F.E.F., told THE IRON AGE these 14-man committees are on call every day of the year. These foundrymen meet officially twice a year

but interest doesn't stop there. A scholarship program, which costs the foundry industry over \$80,000 annually, has been set up.

In all the 14 affiliated schools from 5 to 16 scholarship students have already expressed a preference for casting metal. In addition to working summers in nearby foundries most scholarship students are also encouraged to complete special foundry projects by actually doing their research work in the foundry.

Members of most advisory committees are on campus at least once a month to see if they can do anything to help with course design, lab facilities or individual encouragement. Paving the way for numerous plant visits and supplying sample castings for instructors is also routine.

## Schools, Foundries Cooperate

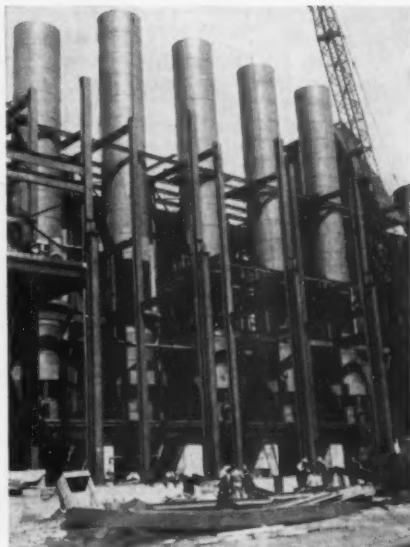
While these changes have been marked, the industry and F.E.F. are aiming even higher. If their ultimate goals are achieved an adequate pool of engineers will be available to the industry. Those who don't move directly into the industry should at least turn out to be castings-conscious customers.

Close cooperation between schools and foundries is also expected to keep foundry courses up to date. So far problems connected with automation, high pressure molding, nodular iron and other up-to-the-minute developments are being adequately covered for the benefit of engineers with a foundry option.

On the high school level foundries are also concentrating on the boy who doesn't intend to go on to professional training. Executives close to this problem are going out of their way to give crafts instructors some of their free time. Plant visits are also helping.

In addition to these recruiting factors, foundry trade associations are also discovering that it pays to invite high school students and faculty members to monthly meetings.

Farsighted foundrymen know these programs cost money and take time. But they believe their investment will pay off.



**FIVE** of six cupolas Buick is adding to double Flint foundry capacity. Daily tonnage will rise to 2800.



## Funds:

### Air Force, Navy get bigger shares; Army gets less.

Greater responsibility for future defense of the U. S. will be entrusted to air and sea forces, the Senate made clear last week in passing the \$29.2 billion military budget bill covering fiscal 1955.

House-Senate differences in the trimmed-down money bill will be worked out by conferees representing both chambers.

In the Senate version the Air Force would get nearly \$11 billion, the Navy \$9.7 billion, and the Army \$7.6 billion. For the Army, this sum represents a cut of more than \$5 billion from its fiscal 1954 appropriation.

### Plan on 137 Wings

Within the limits of its reduced budget, the Army expects to be operating with 17 divisions a year from now. It is currently at 20-division strength.

The Air Force, now at a

strength of 115 wings, expects to expand to 120 by the end of June, 1955. Three years from now, air wings are expected to number 137.

New atomic submarines for the Navy would be doubled by use of funds in the forthcoming final budget. Two new subs are provided for, in addition to the two now being built.

Important to machine tool builders is a Senate-approved amendment to the bill carrying over an earlier authorization of \$250 million for buying of new productive equipment through fiscal 1955. Though this amount was available during this fiscal year, Defense Dept. thought it wise to refrain from spending it (see p. 83).

Official reason given for not using these funds is that no complete inventory of productive machinery now owned by the military is available. Work on this inventory has been in progress for many months at Office of Defense Mobilization. But the government doesn't yet know exactly how many usable machine tools it has or what shape they are in.

## Mobilization:

### Pre-attack planning vital to industry's survival.

Advance planning to insure uninterrupted defense effort in case of enemy attack is the most important contribution industry can make to U. S. survival, President Eisenhower told 250 leading industrialists recently.

"A program for effective industrial defense may constitute the most valuable investment you can make toward assuring our survival as a free nation," he said.

Other civil defense and mobilization officials asserted that the nation's survival demands more rapid scattering of industry.

Several companies, including Koppers Co., Inc., and Standard Oil of New Jersey were praised for their emergency attack plans. These preparations include establishing alternate offices in non-target cities; duplication and storing of designs, records, spare parts, machines in safe places.

## IRON & STEEL: May Output By Districts

As Reported to the American Iron and Steel Institute

DISTRICTS	BLAST FURNACE —NET TONS	PIG IRON		FERROMANG. & SPIEGEL		TOTAL				
		Annual Capacity	May	Year to Date	May	Year to Date	May	Year to Date	Pct of Capacity	
									May	Year to Date
Eastern.....	17,261,850	936,930	5,234,307	24,086	105,726	961,016	5,340,033	65.5	74.7	
Pitts.-Yngstn.....	29,501,270	1,564,280	8,295,965	21,510	163,983	1,585,778	8,399,948	63.3	69.8	
Cleve.-Detroit.....	8,714,680	467,368	2,390,854			467,368	2,390,854	63.1	66.3	
Chicago.....	16,371,250	1,033,784	5,271,401			1,033,784	5,271,401	74.3	77.8	
Southern.....	6,273,080	351,957	1,980,559	6,583	42,228	358,540	2,022,787	67.3	77.9	
Western.....	3,679,260	217,953	1,051,352			217,953	1,051,352	66.1	65.5	
TOTAL.....	82,001,390	4,572,252	24,224,438	52,187	251,937	4,624,439	24,478,375	66.4	72.1	

DISTRICTS	STEEL —NET TONS	TOTAL STEEL				ALLOY STEEL			
		Annual Capacity	May	Year to Date	Pct of Capacity		Index**		Year to Date
					May	Year to Date	May	Year to Date	
Eastern.....	25,864,060	1,417,459	7,340,776	64.5	66.6	102.2	100.7	75,467	405,624
Pitts.-Yngstn.....	44,348,060	2,554,921	12,869,763	67.8	70.2	90.1	93.3	329,598	1,709,588
Cleve.-Detroit.....	12,791,780	769,255	3,541,967	70.8	66.9	125.8	118.9	54,633	262,387
Chicago.....	27,371,700	1,673,644	8,665,366	80.6	76.7	120.4	114.6	98,797	x480,726
Southern.....	6,932,340	415,996	2,180,363	70.6	76.0	119.4	128.4	9,115	36,010
Western.....	7,022,470	441,261	2,129,843	74.0	73.3	117.3	116.2	7,959	35,678
TOTAL.....	124,330,410	7,472,738	36,767,996	70.7	71.5	105.0	106.1	575,569	x2,930,225

\*\* Based on average production of the three years 1947 through 1949 as 100.

x Revised.

## Contracts Reported Last Week

Including description, quantity dollar values, contractor and address. Italics indicate small business representatives.

Item 1—crane, eng or turret port 175, \$1,224,538, Hammond Mfg. Corp., Pasadena, Calif.

Item 1—trailer, airdrome, 1500, \$511,039, Welded Construction Engrs., Cleveland, Ohio.

Pulse generator, 143, \$377,124, Model Engineering and Mfg., Inc., Huntington, Ind.

Fuel pump assy, Var, \$1,480,953, Thompson Products, Inc., Cleveland, Ohio, *B. Bosch.*

Computer test set, 64, \$236,006, Westinghouse Electric Corp., Philadelphia, Pa. *W. C. Wilson.*

Ground handling equipment, Var, \$67,844, McDonnell Aircraft Corp., St. Louis, Mo., *H. L. Giesler.*

Antenna, Var, \$78,956, Grumman Aircraft Eng. Corp., Bethpage, Long Island, N. Y.

Inverter, 188, \$83,671, Leland Electric Co., Dayton, Ohio.

Brake assys, 626, \$474,891, Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

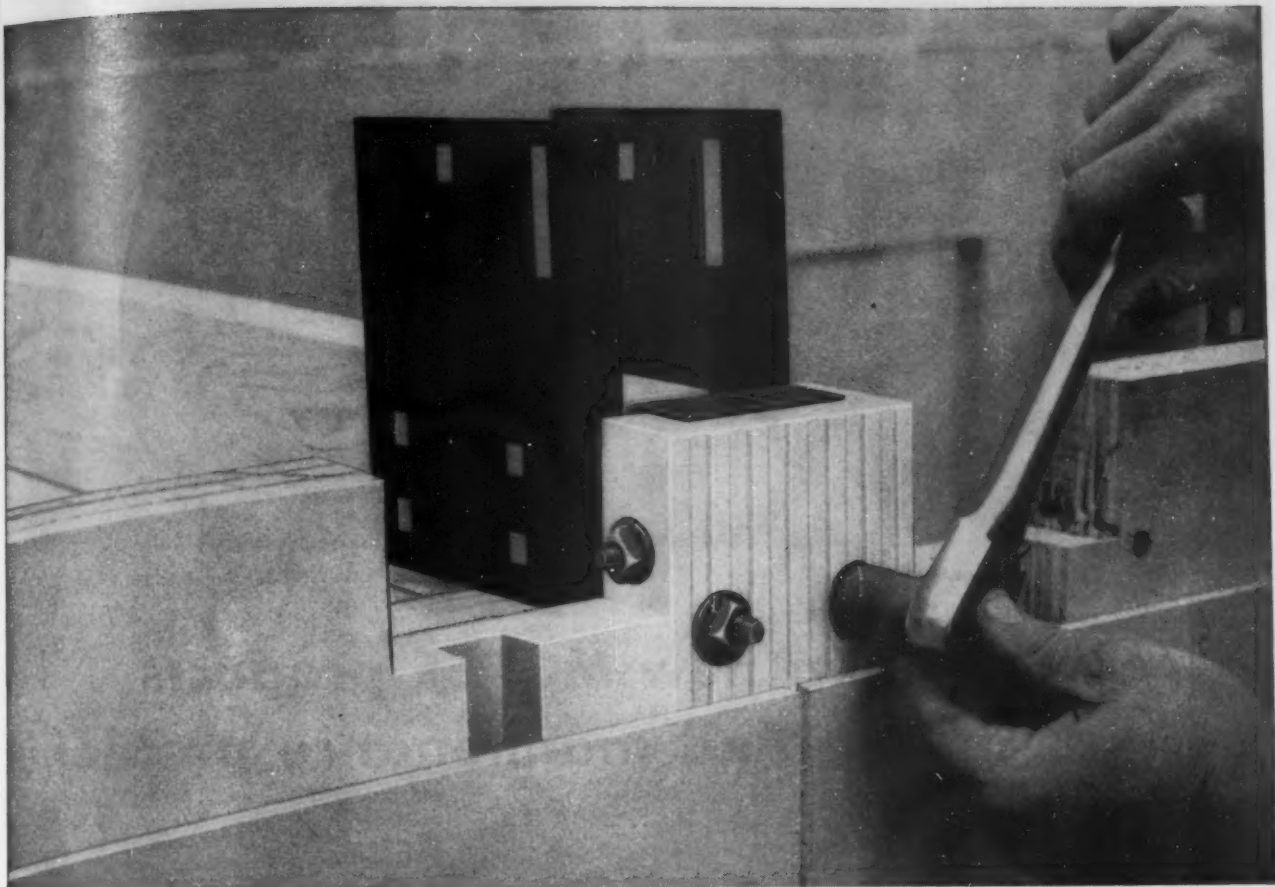
Wheel brake assy, 510, \$335,583, The Goodyear Tire & Rubber Co., Akron, Ohio.

Trainer airplanes, \$2,307,076, Beech Aircraft Corp., Wichita, Kan., *J. F. Allen.*

Motor and drive assy, 577, \$705,143, Sperry Gyroscope Co., Great Neck, N. Y. *George A. Dennis.*

Camera body, 675, \$2,875,425, Fairchild Camera and Instrument Corp., Syosset, Long Island, N. Y.

Crane, cruiser, Var, \$494,825, The Good Co., Marion, Ohio.



**RAISING THE ROOF** of a U.S. Steel home goes faster with help of RB&W bolts. Here workman is tightening bolt holding steel plate to exterior wall panel. Plate is then used as joint for bolting ceiling panels.

## That's a house he's bolting together!

U.S. Steel Homes found that bolting together the panels of their fast-selling homes saves time and trouble. Nails are used only to hold panels temporarily in position for bolting and add no structural strength.

It's no accident, of course, that RB&W bolts and nuts were specified here. U.S. Steel Homes isn't the first to discover that the absolute uniformity and dependable holding power of RB&W products make them the best fasteners for any job. Workmen like the way RB&W nuts run on RB&W bolts fast and easy. And there's no question about the extra strength RB&W bolt-and-nut construction gives these homes.

Whenever you want to put something together *fast*, and make it stay fastened *for good*, give one of our men a ring. As a top-ranking maker of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. You can count on fast delivery, too. **RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N.Y.**



**HOUSE GOING UP.** U.S. Steel home nears completion as workmen on scaffold (right) bolt on exterior panels. These sturdy homes offer quality construction at budget price.

3.8



**109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG**

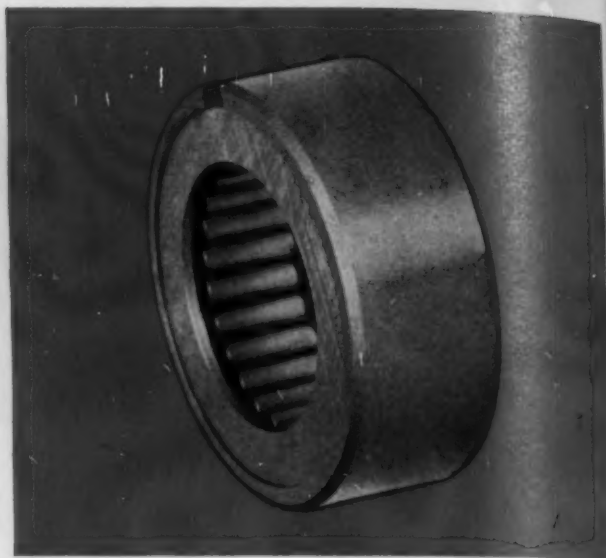
Plants at: **PORT CHESTER, N.Y.; CORAOPOLIS, PA.; ROCK FALLS, ILL.; LOS ANGELES, CALIF.** Additional sales offices at: **ARDMORE (PHILA.), PA.; PITTSBURGH; DETROIT; CHICAGO; DALLAS; SAN FRANCISCO.** Sales agents at: **PORTLAND, SEATTLE.** Distributors from coast to coast.

June 24, 1954

73



Torque Limiter



200-Series Cam Clutch

## NOW! Two new MORSE products to solve design and maintenance problems

### 1. New Morse Torque Limiter

Eliminate the inconvenience, expense and machine downtime connected with resetting shear-pin mechanisms. The Morse Torque Limiter is torque-sensitive, compact and tamperproof.

Torque adjustable and adaptable, the Morse Torque Limiter can be used with sprockets, gears or pulleys. It gives positive protection on machine drives and automatically slips at overload setting and resets when overload condition is corrected.

The Torque Limiter is available from stock in diameters from 3" to 10"; maximum ratings from 20 through 628 ft.-lbs.

### 2. New 200-Series Cam Clutch

The simplicity of design, ease of installation and maintenance make Morse 200-Series Cam Clutches as adaptable as bearings for indexing, over-running and backstop applications.

Ground to same outside diameters as 200-series bearings, they will fit housings bored to accommodate these common bearing sizes.

The Morse 200-Series Cam Clutch combines maximum torque capacity with minimum space requirement. It is a self-contained assembly, furnished without inner races; can be mounted directly on shafting. Clutches are furnished pre-lubricated, ready for immediate installation.

**Get more details.** For information on Morse Torque Limiter, write today for Catalog C 14-54. For information on 200-Series Cam Clutch, ask for Catalog C 12-54. Morse Chain Company, 7601 Central Avenue, Detroit 10, Michigan.



FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893





# REPORT TO MANAGEMENT..

The Thirties revisited

Our recession has been a mild one. But for a lot of firms it must seem like the early Thirties all over again.

Business failures have been running at a distressingly high rate throughout the year. Perhaps you've even had to x-out a couple of names on your own customer lists.

Tally on business failures through early June shows that 5255 industrial and commercial firms have folded so far this year. That's 33 pct more than went out of business during the same period last year, 43 pct more than in 1952.

Coming faster than they go

This is bad news--but it would be a lot worse if it weren't for the fact that new firms are being formed faster than at any time since the postwar push in 1946 and 1947.

Dun & Bradstreet reports that in the first 4 months of 1954 there were 38,862 new business incorporations, a 6.2 pct increase over same period last year. In April alone, 10,272 new businesses were chartered, 2.3 pct fewer than in March, but still the highest figure for any April since 1947.

What does it mean?

That so many businessmen are willing to start up a business during a period when the economy is downtrending is just another indication business and industry are extremely confident they can take the current readjustment in stride.

It's the same kind of thinking that makes businessmen willing to spend more than \$27 billion on new plant and equipment during the current year (only 4.4 pct less than record '53's \$28.25 billion). And it's one of the very important reasons the recession hasn't been promoted into a really serious economic decline.

Some bright spots...

The economy racked up a couple of important firsts last month:

(1) Industrial production index was up 2 points (to 125) on a seasonally adjusted basis, according to Federal Reserve Board's preliminary estimate. This was the first gain in the index since last July.

(2) Factory workweek rose one-third of an hour to 39.3 hours for its first increase since February.

Average weekly earnings of factory workers were also up, rising 93¢ (to \$71.73) from April to May for the largest over-the-month increase in a year and a half. The gain resulted from the longer workweek and a 1¢ rise in gross hourly pay.

... and some dark ones...

But all is still not well with employment. Unemployment, though down, is dropping less than seasonally and though the factory employment decline is slowing, workers are still being laid off. Major employment drop continues to be centered around metal-working, with transportation equipment, machinery and electrical machinery industries showing the greatest losses.

June 24, 1954

# Industrial Briefs

**Grand Opening . . .** The new headquarters building of National Lead Co.'s experimental test station in Sayville, Long Island, was officially opened last week. The building contains offices and paint shops for the station.

**Purchased . . .** Steel Improvement & Forge Co. has purchased the Champion Forge Div. of Champion Industries, Inc. The Champion plant is at 3685 East 78th St., Cleveland.

**Contract . . .** McLouth Steel Corp. has awarded a contract for the largest annealing installation of its type to Lee Wilson Engineering Co., Inc., Cleveland.

**Agreement . . .** Republic Steel Corp. has made an agreement for the purchase of property and assets of Cleveland Chain and Mfg. Co. and its affiliated companies known as the Round Chain Companies.

**Announcement . . .** Dow Chemical Co. opened a new field office in Cincinnati at 2330 Victory Parkway to serve customers in southern Ohio, southeastern Indiana and sections of Kentucky and West Virginia.

**Elbow Room . . .** Samuel M. Langston Co., Camden, N. J., has moved its parts department into larger quarters to provide faster handling of orders for replacement parts.

**Buys Land . . .** Battelle Institute, Columbus, Ohio, has just completed purchase of a 397-acre plot of land 15 miles west of downtown Columbus. The acreage is needed because of newly developed opportunity for Battelle to engage in more large-scale experimental projects.

**Available . . .** Crucible Steel Co. of America has added Coulter blades to its line of specialty steel products.

**Elected . . .** Manufacturing Chemists' Assn., Inc., elected Fred J. Emmerich, president, Allied Chemical & Dye Corp., chairman of the board of directors.

**Awarded . . .** The L. S. Starrett Co., Athol, Mass., received an award for advertising excellence from the National Industrial Distributors' Assn. and the Southern Industrial Distributors' Assn.

**Windy . . .** North American Aviation, Inc. has been awarded a construction contract for the major portion of a \$4.5 million wind tunnel capable of testing airplane and missile designs at speeds ranging from 400 mph to more than three times the speed of sound.

**Purchased . . .** Gramer Transformer Corp., Chicago, has purchased the Halldorson Transformer Co., 4500 North Ravenswood, Chicago.

**Announcement . . .** General Electric Co., Schenectady, will begin construction of a new \$5 million plant at Shelbyville, Ind., for the manufacture of industrial furnaces, induction heating equipment, and heating devices.

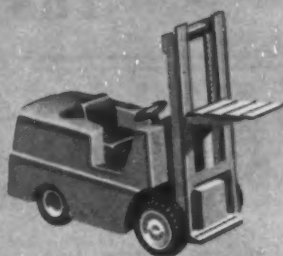
**Honorary Degree . . .** Roy Fruehauf, president of Fruehauf Trailer Co. was awarded the Honorary Degree of Doctor of Commercial Science at the 70th Annual Commencement of Tri-State College, Angola, Ind.

**Now One . . .** Aluminum Co. of America has consolidated its Die Castings Div. and Casting Div. With this move, all Alcoa foundry operations are organized into a single operating division.

**Grand Opening . . .** Bedford Foundry & Machine Co., Bedford, Ind., has opened a new sales office in Pittsburgh at the Oliver Bldg., Room 1241.

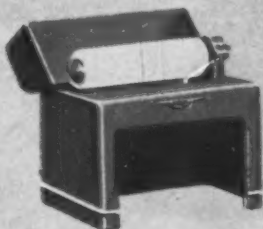
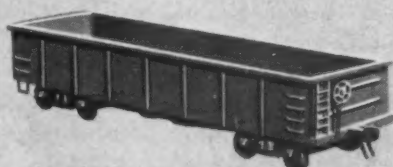


**NEWLY ELECTED** officers of the National Society of Professional Engineers are (seated l to r): L. F. Frazza, vice-president; Clarence Shoch, president; R. B. Allen, treasurer. Standing: Virgil Gunlock, vice-president; O. C. Mayer, vice-president; M. F. Wooten, Jr., vice-president; R. J. Rhinehardt, vice-president.



## YOUR PRODUCTS ARE OUR BUSINESS, TOO!

Autos, appliances, transportation or farm equipment . . . if your products require flat-rolled steel, they deserve the best. And it's our obligation to see that you get the very best that 25 years' specialization in flat-rolled steel can provide.



## GREAT LAKES STEEL CORPORATION

Ecorse, Detroit 29, Mich.

Sales offices in New York, Chicago,  
Cleveland, Grand Rapids, Indianapolis,  
Lansing, Philadelphia.

A UNIT OF

NATIONAL STEEL CORPORATION



# The Automotive Assembly Line

## See Power System Development Soon

**Styling, engine improvements limited . . . Urgent need for auxiliary power for driving aids, accessories . . . Better headlamps, brakes may come in '56—By R. D. Raddant.**

"We have got to make driving easier and easier. People have to be able to drive today's larger and more highly powered cars greater distances with less strain."

The author of that statement was L. H. Middleton, vice president in charge of engineering of Electric Auto-Lite Co. As boss researcher and developer of this company, largest independent manufacturer of automotive electrical equipment, a lot of the responsibility for achieving this goal falls on his own shoulders.

Electric Auto-Lite manufactures a total of 400 different parts and products in 30 different plants scattered across the eastern part of the country. It is best known for headlamps, spark plugs, batteries, generators, voltage regulators, starting motors, distributors, and all parts in automotive electrical systems.

**Demand Auxiliary Power . . .** It's not a glamorous business in a way. But demand for greater driving ease and the necessity of mechanical aids to pilot today's high-powered cars give the auxiliary power system more and more importance.

Probably greater stress will be put on this side of the automobile within the next few years than on any other point. Engines are pretty well frozen for 10 more years, styling has its limits, but development of auxiliaries is still in its youth.

This doesn't mean just the labor saving extras, but the vital things such as brakes, road illumination, and other basic functions that go with the problem of operating safely and efficiently today's complex auto.

**New Lamps Coming . . .** Next improvement in this direction will be a new headlamp, already in the works, to replace the conventional sealed beam lamp used today. Originally scheduled for the first 1955 cars, it was somewhat delayed and probably won't be ready until midyear.

Automakers and accessory manufacturers don't like to talk about it, but both road illumination and brakes have lagged. While cars have become heavier and faster and the roads more crowded, these features have not maintained the same pace of development.

Power brakes have been added, it is true. But the basic principles

have remained the same. One accessory company will soon introduce a new disk brake, a development that may have wide significance in U. S. brake design.

**See Power Package . . .** Then there is the problem of tying in all these powered accessories in one package. Last April Mr. Middleton disclosed his concept of a grapefruit-sized electro-hydraulic power system that will wrap up all present powered units and some that are still hand operated in a single system.

With almost 25 pct of the cars sold today already equipped with a pump for power steering, why not tie in other units to the hydraulic power? It could be done simply with a closed center pressure system with an accumulator. Plumbing, of course, would have to be built into the body of the car.

Mr. Middleton estimates that under such a system, mass produced, some automatic controls could actually be added at less cost than manually operated units.

This concept took a lot of selling before the auto industry agreed it was practical. You can look for the first ones in 1956 although units are being tested by Auto-Lite, General Motors, and others.

**Need Wrap-around Wiper . . .** Continuing on the accessory line, one of the toughest problems tackled by the industry in years



**CONTRAST** 1915 Dodge test track with 4.7-mile concrete oval now used by Chrysler. Firm has new 4000-acre Engineering Proving Ground at Chelsea, Mich, (see p. 75). Cars get up to 200 separate performance tests.

is a wiper for wrap-around windshields. No one has yet come up with an inexpensive answer although everyone is agreed that present wipers are not adequate for the panoramic trend.

Many ideas, some of them seemingly fantastic, have been tried. A heating type washer is an example. One method worked all right, but would cost several hundred dollars. However, it is only through trying any number of methods that the right combination will be found. To date, that combination still eludes engineers.

## Testing:

### Chrysler unveils super proving ground.

With the amazing new developments that occur daily in the auto industry, the proving ground is becoming a more and more valuable property for any auto company.

That is the principal reason for Chrysler's understandable pride and pleasure in opening its own proving ground last week at Chelsea, Mich. (near Detroit). Its more than 3800 acres are already in use in a long term improvement program (see photos, p. 72).

Just as the race track is the focal point in improvement of the equine breed, the high speed oval is the focal point in improvement of the automotive breed. Endurance and performance, of course, are the yardsticks by which any product is judged. In developing automobiles, there is no substitute for actual road testing regardless of the contributions of the highly intricate testing laboratories.

### Set Stock, Ladies Records

In opening its proving ground, Chrysler put on an auto performance spectacle matching any for excitement and color. And the stars in most of the show were Chrysler's own products.

Pretty Betty Skelton, 27-year-old speed queen, set a women's world speed record of 143.44 mph in a Dodge Firearrow sports car. The slick Firearrow, powered by

a hopped-up Dodge V8 engine, whipped around the 4.7 mile closed track in less than 2 min.

Winding up a grueling 24-hr stock car speed and endurance test, a Chrysler New Yorker sped around the clock for a total of 2836 miles at an average of 118 mph, including brief pit stops. This record may be permanent property of Chrysler since there is no other track in the country capable of sustaining such speeds.

### Demonstrate Gas Turbine

The gas turbine-powered Plymouth was put briefly through its paces by George J. Huebner, Jr., executive engineer, who disclosed that the engine averaged 14.9 miles per gallon in road tests at constant speed of 40 mph.

With its regenerative gas turbine unit, the car showed performance characteristics equal to a standard model. Only apparent difference was the audible intake whine characteristic of all turbines.

To demonstrate the track's speed the first 4 place winners of the

## Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
June 19, 1954..	120,475*	21,403*
June 12, 1954..	118,191	21,121
June 20, 1953..	149,601	20,756
June 13, 1953..	146,408	20,687

\*Estimated. Source: Ward's Reports

Indianapolis 500 mile race competed for lap records. Winner was Jack McGrath, who took pole position at Indianapolis with a speed of 141.033 mph. His proving ground time was a sizzling 179.386.

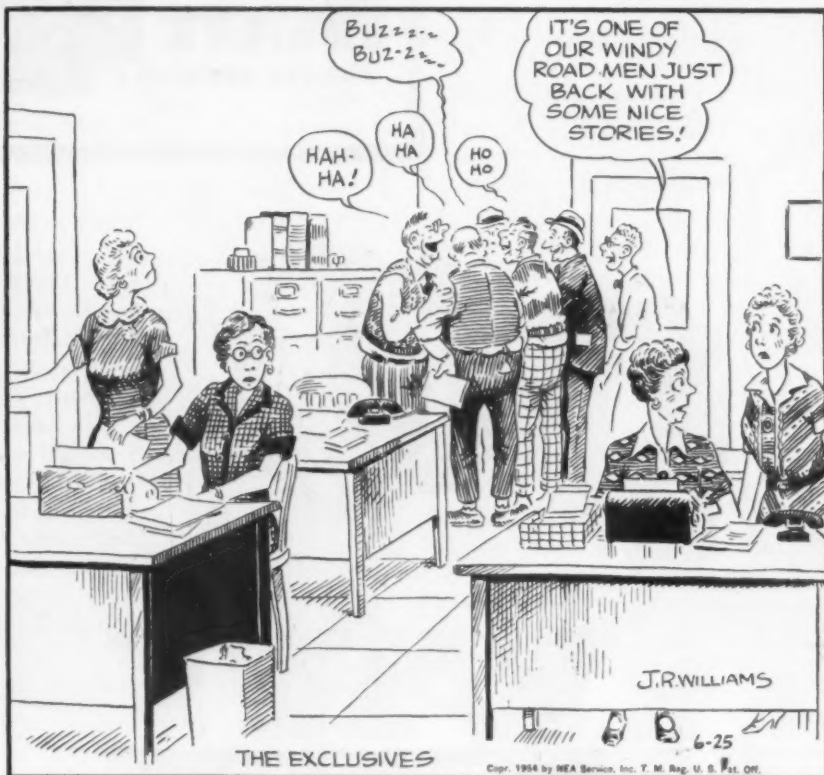
## Oscilloscope Tests Ignition

One of the neatest devices in any plant is an adaptation of an oscilloscope at Auto-Lite's distributor plant in Toledo to check and adjust the spark gap of each distributor.

Called an igniton analyzer, it is set up with a master distributor with the proper spark gap setting a pattern on the screen. Each new distributor is hooked up to the scope and adjusted to conform.

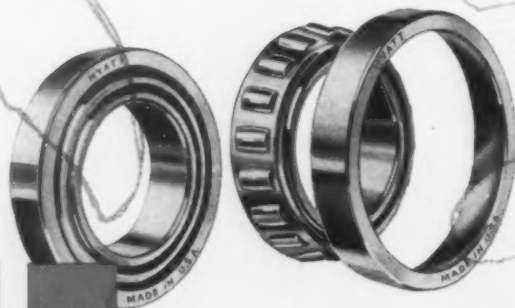
## THE BULL OF THE WOODS

By J. R. Williams



Always within easy reach . .

**Hyatt's  
New  
Line of  
Dual-Purpose,  
Self-Aligning  
BARREL  
BEARINGS!**



**HYATT**

STRAIGHT

BARREL

TAPER

Got a bearing problem? Just reach for Hyatt's new Barrel Bearing Catalog! This is one catalog engineers have been waiting for, because it's essentially a guide to lower maintenance costs! Barrel Bearings are not only dual-purpose in design; they're also self-aligning. They operate with full efficiency under misalignment conditions which cause excessive wear in ordinary bearings. If your job involves bearing specifications, make sure you have Hyatt Catalog No. B-154. It puts a complete line of Barrel Bearings right at your finger tips. Write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



## This Week in Washington

### Better Business Strengthens GOP

**Improvement in economic factors improves chances of Republicans in congressional election . . . Must be without war . . . Extend tool purchase fund—By G. H. Baker.**

A Republican victory at the polls this November is by no means assured at this early date, but party leaders are beginning to grumble a little less as they note new zip in sales reports and factory output records.

Their reasoning: Folks with jobs and a few bucks in the old sugar bowl usually don't vote to upset political applecarts. If the machinery of business can be souped up somewhat (no war, however; it's got to be prosperity won the "hard way") to chug along just a little faster between now and Nov. 2, the election should be a shoo-in for Republicans.

**Still Like Ike?** . . . In effect, the voters are to be asked in November if they still like Ike. That's what the issues settle down to, for the vast majority of GOP candidates are running on President Eisenhower's platform. Victory for Republican candidates in the Senate and House will mean the White House can count on enactment of just about everything it proposes in the next 2 years. It will mean a real "second honeymoon" for Mr. Eisenhower and Congress. But if the voters demand a Democratic Congress, the President's legislative plans for the next 2 years can be sponged out.

Right now, it looks fairly good for the Republicans. Here's why:

Construction has hit a new record high and shows no signs of letting up; the average work-week is up by 18 minutes; unemployment continues to drop; department store sales are holding steady instead of entering their seasonal decline; sales of new and used cars are up, and production of coal and iron ore are finally

beginning to move out of the cellar.

**Green Light for Tools** . . . First purchases by the government of machine tools for the "mothball" defense plant program may get under way late this year. The Senate has approved the Defense Dept. request for a 1-year extension of a \$250 million kitty for tool purchases, and the House indicates it will follow suit.

Defense Dept. planners have had this sum available to them for the past 2 fiscal years, but have held off committing any part of it pending completion of the huge job of inventorying stocks of tools on hand.

"We expect next year to have that inventory completed and know where we stand," says L. S. Garlock, the Defense Dept. deputy budget controller.

Under the "mothball" plan, tools will not be dispersed in warehouses, but will be kept together in integral units containing all the tools for a single plant. And these "package" inventories will



**NEW BDSA assistant administrator R. G. Boyd being sworn in by Commerce Secretary Sinclair Weeks.**

be combed over from time to time to weed out obsolete tools. (See page 83 for further details.)

**May Sell Tin** . . . Continued operation of the government-owned tin smelter at Texas City, Tex., for another year now seems assured, but the mill's output isn't necessarily going into the war stockpile.

Government defense planners estimate they have a 7-year supply of refined tin on hand. They may offer tin to civilian buyers.

The Texas City mill, which processes low-grade Bolivian concentrates, had been slated to close down on June 30, but the possibility that Communists may take over the high-grade Malayan tin deposits caused Congress to vote a 1-year extension of the Texas City operation.

**Extend Duty Suspension** . . . Senate Finance Committee has approved suspending duties on copper and raw and refined bauxite. The committee voted to continue for 1 year the suspension of the 2¢ per lb import duty on copper as long as the domestic price of the metal does not fall below 24¢ per lb. Copper is now 30¢.

Following Senate passage, the copper bill will have to go to a conference committee with the House, which earlier passed the bill, but called for a 2-year suspension. Congressional sources predict the 1-year extension will be in the final bill.

A 2-year suspension of the present duty of 50¢ a ton on raw bauxite was approved by the committee. It also added a provision suspending the duty on calcined bauxite when it is to be used in fire brick and refractory products. Treasury department will determine when this refined ore meets the requirement.

**Won't Recontrol Nickel** . . . Government will not recontrol nickel short of an all-out emer-

## Which wall construction helps speed production?

Reductions in heat loss and heat storage can speed up a furnace's operating cycle and increase production capacity. This boost in efficiency can often be obtained by making a simple change in furnace wall construction.

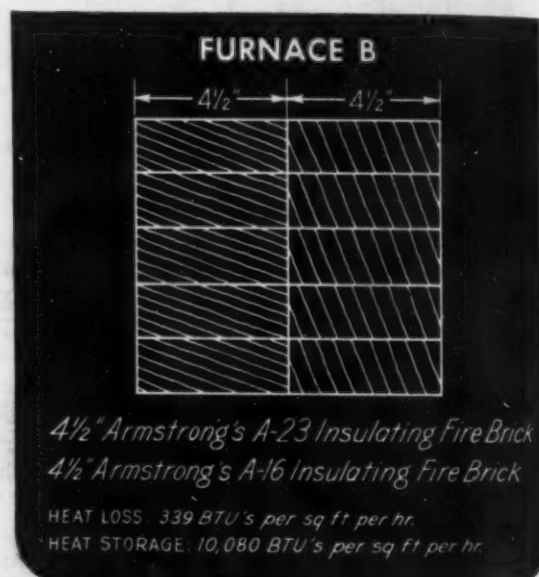
Furnace "A" above has a lining of 9" of heavy-duty fire brick and is backed up with 4½" of 2000° insulating brick. Heat loss with this construction is 408 BTU's per square foot per hour, while heat storage is 46,894 BTU's.

See how performance improves with the more modern design of furnace "B". This construction uses 4½" of Armstrong's A-23 Insulating Fire Brick as lining and 4½" of A-16 as back-up. Heat loss is cut to 339 BTU's per square foot per hour, a reduction of about 14%. Even more important, heat storage is reduced to only 10,080 BTU's—a reduction of almost 78%!

The fuel savings resulting from the lowered heat loss are valuable, but of greater importance is the faster operating cycle brought about by the large drop in heat storage. The furnace cools more quickly, so it is possible to get treated parts out and a new batch of parts in much more rapidly.

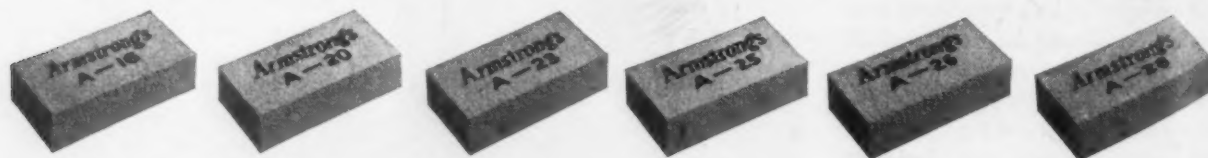


**ANNEALING OVEN:** gas-fired; cyclic operation; maximum temperatures: 1780° to 2000° F.



### Do you have a furnace problem?

Whenever you have a furnace rebuilding or lining job, you'll find it's a good idea to consult your Armstrong engineer. His expert knowledge of furnace construction and insulating fire brick will help you get top operating efficiency from your furnace. For his help, call your nearest Armstrong office or write Armstrong Cork Company, 2706 Susquehanna Street, Lancaster, Pa.



## ARMSTRONG'S INSULATING REFRACTORIES

gency. Instead, the government is relying on industry's voluntary allocation system and the Defense department's "take" powers. At present, say the planners, nickel is "almost easy" as a result of currently reduced hard-goods production.

If the military steps up its orders, or production experiences an upturn, the metal will again become critically short.

Military, which recently announced it would further reduce its needs, has not yet cut its orders, but probably will in the third and fourth quarters.

**Cut Bid Requirements . . . Keener** competition for military transportation contracts is predicted, now that Congress has prodded the armed forces into agreeing to relax bid requirements.

Standing procedure has been to accept bids only from transportation brokers, who contract for packing and delivery to and from the common carrier which will do the basic hauling. Now companies willing to handle the complete hauling job, start to finish, are eligible to compete.

Armed Forces say that in the past they understood Interstate Commerce Commission rulings to mean they could deal only with licensed brokers. A current ruling from ICC makes no such requirement.

Elimination of the added packing and delivery charges is expected to produce appreciable savings for the military.

## Enforce Non-Discrimination Policy

Non-discrimination as regards race, color, or religion of persons working on defense contract projects will be emphasized by the military forces.

This close attention to the White House policy calling for equality in job opportunities was ordered last week by Defense Secretary Wilson. He called on the military departments to notify suppliers of defense materials and services that complaints of non-compliance will be reported to contract committee.

## Building:

**Home, commercial starts exceed '53 estimates.**

Industrial building outlays will probably add up to nearly \$2 billion this year, with total private and public investment in construction climbing to a new high of \$36 billion.

There has been a decline in starts of privately-owned manufacturing plants since January, but over-all drop in industrial construction is not expected to be more than 13 pct below the 1953 figure of \$2.23 billion.

Forecasting this strength in the building field are officials in the U. S. Commerce and Labor Depts. They are already convinced that last November's estimate of \$34 billion for new structures in 1954 was about \$2 billion low.

### Start Million Homes

Today these officials predict investment exceeding the 1953 record level of \$35.3 billion by 2 pct. The new estimate calls for \$24.15 billion worth of private building and \$11.85 billion in public expenditures. By categories, trends currently in progress point to:

1. Starts on 1.08 million non-farm private homes, costing perhaps \$10.7 billion. Adjusted seasonally, the annual rate has been well over a million starts thus far this year.

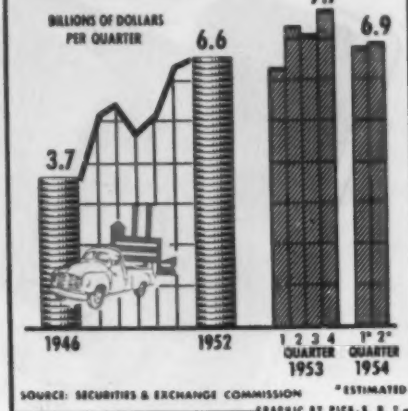
2. Record investment of more than \$2 billion in new commercial

### Seek Trucking Reciprocity

Truck reciprocity is a problem of such proportions that nearly every individual or group in the highway carrier field has a different idea about possible solutions.

This wide range of opinion was illustrated at a recent transportation meeting in the Capital, when one speaker proposed an equipment change to facilitate reciprocity. The change: Limiting the size of gas tanks on trucks to force drivers to buy gas in every state between loading point and destination.

## EXPENDITURES BY U.S. BUSINESS FOR NEW PLANT & EQUIPMENT



structures is indicative of booming activity in office building construction, suburban shopping centers and stores.

3. An increase of around 2 pct in construction of public utility facilities, with the year's total running about \$4.5 billion.

4. New records in the building of public schools, highways, and sewer and water facilities. Highway construction will cost almost \$3.7 billion, reflecting a 15 pct increase over outlays in 1953.

## Rates:

**Western Union seeks \$10 million boost.**

Cost of communicating by commercial telegraph is slated to rise by about \$10 million annually, unless the government moves to whittle down the coming increases.

Proposed new rates filed by Western Union with Federal Communications Commission will go into effect July 15 unless suspended on government initiative. Higher rates would apply to all interstate messages and money orders, increasing the cost of an average message by 11 pct. WU says it will apply to state regulatory agencies for comparable intrastate rate increases.

Wage increases granted recently have added about \$7 million a year to its costs, WU states. New rates will give a quantity discount to customers with direct wire connections.





## WHAT DO YOU WANT TO KNOW ABOUT ***DIE BLOCKS and FORGINGS***

How they are made? How they are tested? How to make dies last longer? How to heat treat? The many uses of forgings? This 92 page booklet tells all about die blocks and forgings. In addition there are over 20 pages of helpful tables and measures including a section on standard practices and tolerances for impression die forgings.

This booklet is offered free to users of die blocks and forgings to help in the selection of quality products . . . what to look for and what to expect from your supplier.

*Please send your request to the nearest Finkl office listed below on your company's stationery giving your name and position.*

You can profit from our experience in the manufacturing of die blocks and forgings. The quality control in each step of processing from our own electric steel furnaces to the finished product shows in the field in greater performance and longer life. Call on Finkl for the finest in die blocks and forgings.



MANUFACTURERS OF THE  
LARGEST FORGINGS IN  
THE MIDDLE WEST

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PITTSBURGH 22: 762 Gateway Center. ATLantic 1-6391 • INDIANAPOLIS 5: 132 East 30th Street.  
HICKory 4647 • HOUSTON 1: PO Box 1891. CAPitol 2121 • ALLENTOWN: 737 North 22nd Street.  
HEmlock 4-3333 • ST. PAUL 1: 445 Endicott Bldg. CEDar 1600 • COLORADO SPRINGS: 534 West  
Cheyenne Road. MEIrose 2-0431 • SAN FRANCISCO 5: Monadnock Bldg. EXbrook 2-7018 • SEATTLE 4:  
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## West Coast Report

### Boost Aluminum Production, Products

**Anaconda rushes new Montana plant . . . Alcoa to raise ingot capacity . . . Seattle fabricators mushroom, find new markets . . . Merchant shipbuilding gets a lift—By T. M. Rohan.**

Construction of Anaconda Aluminum's 72,000-ton reduction plant at Columbia Falls, Mont., was finally resumed last week after a 10-week delay, pushing final completion day back to late 1955. Carpenters, the largest segment of 6 basic construction trades in the area, threw up picket lines April 5 which idled all 1200 workers.

Basic demand was 25¢ per hour increase settled last week for 15¢ at \$2.65 per hour with 10¢ to 12¢ increases for other skilled workers. About 250 concrete and excavation workers returned to work last week and the remainder are expected in three weeks. Heavy pressure will be exerted to get buildings finished during the short Montana summer so interior installations can progress during the winter.

Installation of a 7-mi power transmission line from Hungry Horse dam progressed during the strike and is expected to be completed in 45-50 days.

**Increase Capacities . . .** In Los Angeles an informed spokesman at Harvey Machine Co. said the firm is going ahead with plans for its 54,000-ton aluminum reduction plant at The Dalles, Ore., stating reports of cancellation of third round aluminum expansion are only rumors.

Aluminum Co. of America starts installation next week of a \$175,000 aluminum ingot casting machine at its Wenatchee, Wash., reduction plant. New machine will cast 10 tons of aluminum ingots per hour in easier form for subsequent operations.

In Seattle, increased aluminum products sales have mushroomed

at least two local firms in recent months. Durell Co., producer of windows and doors, now has offices in all principal west coast cities. President Ernest Anderson said last week Seattle may become one of the principal aluminum products centers in the U. S. in a few years because of close supply sources and skilled labor availability. Firm's principal markets are in schools and public buildings which now specify aluminum accessories in new construction plans.

Teeler Co., another Seattle fabricator, has blossomed in a few years from one small building to a plant covering an entire city block, and now supplies products to the entire West Coast.

**Build Merchant Ships . . .** The first ocean-going ship built on the West Coast for a private operator in 25 years went down the ways in San Francisco this week. And there were indications last week a \$40 million atomic submarine

may be built in the area.

The SS *Golden Bear*, built by Bethlehem Pacific Shipbuilding Div. at San Francisco, is the first of three 22,000 long-ton Mariner type cargo vessels being built for Pacific Far East lines under U. S. Maritime contract.

Like five others in the \$47.5 million program (of which it is third), it was originally scheduled for the Maritime agency, but shortly after start of construction was sold to Pacific Far East. Modifications for the line included improved passenger cabins, new cargo handling equipment, air conditioning, refrigeration and communication system, and power operated rolling hatch covers.

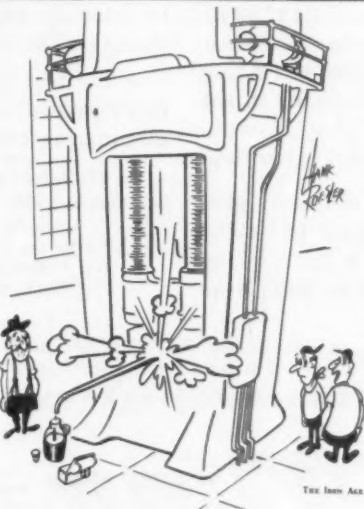
Redesign of accessories caused about 2 months' delay. Since the West Coast contract was let a year later than that for 30 other ships in eastern and Gulf Coast yards, adaptations were made with a minimum of expense as well as other improvements.

#### Train Shipyard Craftsmen . . .

T. C. Ingersoll, Bethlehem Pacific's shipbuilding manager, told THE IRON AGE last week it is continuing its recruiting program for skilled shipyard craftsmen to speed up work. Yard now also operates a training school for workers for certain critical jobs. Workers attend on company time and costs are absorbed.

Mr. Ingersoll said about 85 pct of the steel for the remaining three ships is on hand and the yard's backlog is now about 15 months.

**May Build Atomic Sub . . .** At the nearby Mare Island Naval shipyard at Vallejo, Calif., meanwhile, hopes were high for the job of building an atomic submarine. In Washington the Navy announced it expected to lay two keels for atomic submarines this year. Mare Island is the only west coast submarine-building yard and one of only three in the U. S.



"Looks like Luigi brought grapes for lunch, again."

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# **SPEED UP**

## **METAL-CUTTING JOBS**

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Report From  
Allis-Chalmers  
Manufacturing Co.  
Milwaukee Plant

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Kling Friction Saw

### **Jobs Performed**

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angles, round,  
square and flat  
bar stock.

### **Average Cuts**

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1000 to 1300 per  
8 hours

### **What Does It Replace?**

Kling Friction  
Saw in use from  
January 1928 to  
July 1953.

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cut cutting-time IN THE "BEST OF COMPANIES!"\*

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\* The following are some of the companies using Kling Machines:  
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## Machine Tool High Spots

### Senate Approves Vance Fund Carryover

**Some purchases may be made late this year . . . Long lead-time tools most likely . . . No tool buying boom foreseen . . . Still check government's tool inventory—By E. J. Egan, Jr.**

The Senate last week approved a Defense Dept. request for a 1-year extension of a \$250 million kitty for "reserve tools and facilities." According to Pentagon officials, some purchases, particularly of long lead-time machine tools, might be made late this year if House approval follows the Senate action.

The \$250 million was originally appropriated for use in fiscal 1954. Object was to put the so-called "Vance Plan" into action.

**Didn't Spend Any . . .** Defense officials didn't get around to spending any of the money during the fiscal year which ends next week, figured on carrying the fund over to the 1955 year. As a result, military budget makers didn't ask for a similar new appropriation in setting up their 1955 estimates.

First study of the "new look" defense budget early this year was made by the House Appropriations Committee. Noting the unused fund, Congressmen decided the money was not really needed, refused to allow the carryover privilege. At the time, Defense Secretary Wilson's staff couldn't muster enough convincing evidence to support their request.

By the time the budget bill reached the Senate Appropriations Committee, Pentagon officials were a lot more certain they wanted the \$250 million for possible use in 1955. Mr. Wilson's aides carefully outlined their need for the reserve fund as well as the restrictions that would apply to its use.

**Not Specific Enough . . .** For business-hungry machine tool

builders the plans and promises made by the Defense Dept. are singularly lacking in specific tool types and dollar figures. But there was enough sincerity in the proposals to convince the Senate Committee.

The \$250 million reserve has just one more hurdle to clear. Since it is one of the minor differences between the House and Senate versions of the defense budget, it will be discussed by a joint conference committee. But expectations are that it will be allowed to remain intact.

**See No Rush . . .** If the entire "tools and facilities" reserve is again made available to the Defense Dept., can machine tool builders expect a rush of military orders soon? Probably not, for a couple of reasons.

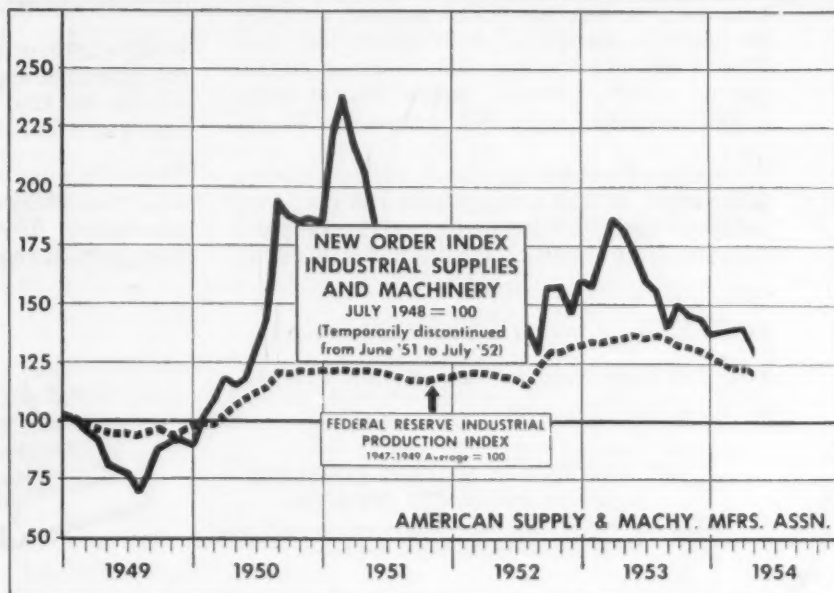
First, although most of the money would surely be used for machine tools, some spending would be used to meet incidental

mothballing and maintenance costs. Also, very nature of the reserve program would limit tool purchases to long lead-time items.

**Still Check Inventory . . .** Big holdup to spending any of the money in 1954 was the incomplete inventory of military-owned machine tools. It's not likely to be finished in detail for several more months, perhaps longer. Search teams are still tracking down equipment. But it's a big, complicated job to spot the exact location, condition and applicability of unknown thousands of tools.

Second reason for builders not to get their hopes too high stems from Defense Dept. caution. Even if machine tool inventories were already complete, there would be no mass purchases of tools needed to fill standby gaps. Despite the difficulty in getting the appropriation reinstated, Secretary Wilson and his staff insist there will be no deliberate attempts to spend the money in 1955. They profess to regard the fund as a reserve.

Exemplifying this caution and economy-mindedness, the matter of establishing complete standby production lines and facilities will be studied one by one.



# WHEN TEMPERATURE IS A PRIME FACTOR

$$\text{Optimum tube for the job} = \left[ \frac{(\text{pressure}) \times (\text{diameter})^2 \times (\text{allowable stress}) \times (\text{length})}{(\text{flow rate})^2} \right]^{1/2} \times (\text{C, temp, atmos})^{1/2}$$

## Tube Selection Cannot Be Reduced to a Formula— Even a Complicated One

Many variables are involved in the selection of the optimum tubing for a specific high temperature application. If the tubing is also to operate under high stress, perhaps the most important variable to be considered is mechanical strength.

In general, the mechanical strength of a steel decreases as the temperature increases. Some steels, however, retain more of their strength at elevated temperatures than others. For instance, at 300F, the ultimate strength of both carbon steel and B&W Croloy 18-8 (Type 304) is about 70,000 psi. At 1200F, however, carbon steel is about 12,000 psi while Croloy 18-8 is about 44,000 psi.

To evaluate the characteristics of metals operating under stress at high temperatures and over long periods of time, B&W has performed stress rupture tests and creep tests on a great number of tubing

steels.\* The results of these tests help engineers to determine the proper tube to be used in specific applications.

Other factors beside mechanical strength, however, must be considered in choosing the optimum tubing for a specific high temperature application. Some of these factors are—oxidation resistance, tube size, tube cost, flow rates, and rates of conductivity and expansion.

It takes an expert to specify the right tubing for any particular application, and there is no substitute for the kind of experience with these problems you'll find at B&W.

To get the most benefit from B&W's long experience in matching tubes to jobs, call on Mr. Tubes, your nearby B&W Tube Representative. He can help you make the best choice.

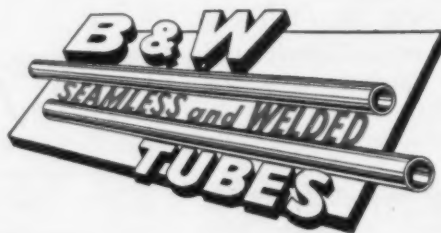
\*Data shown in

TDC 102 Creep Stress Data on B&W Croloys

TDC 153 Stress Rupture Data on B&W Croloys  
available free on request.

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TA-4023 (P)

# *The* **Iron Age**

## **SALUTES**

*Dr. Karl T. Compton*

Scientist, educator, researcher,  
administrator, he's a wellspring  
of New England's brainpower.



**A**S President of Massachusetts Institute of Technology from 1930 to 1948 and as Chairman of the M.I.T. Corporation since that time, Dr. Compton has exerted a profound influence on the progress of technical education in New England and the entire U. S.

His is an almost unique position in the world of American technology. His contributions as a physicist place him among the leaders of pure scientific research. His record at M.I.T. makes him perhaps the foremost technical educator of his time. And his activities in government and industry qualify him as an outstanding practitioner in the difficult art of translating the theoretical seeds of scientific discovery into the fruits of practical action.

After receiving his doctorate at Princeton in 1912, Dr. Compton began his career in research physics, specializing in the study of electron emission from hot filaments and the investigation of matter by means of light waves. Among the many kudos he has received is the Rumford Medal, top award of the National Academy of Sciences for "eminence in application of science to public welfare."

Perhaps the most important contributions Dr. Compton has made to M.I.T. stem from his conviction that an education in science and engineering must be combined with fundamental studies in social sciences in order to better equip the technical man to take an intelligent part in the social and economic development of the country. With this objective in mind Dr. Compton has greatly broadened M.I.T.'s curriculum, adding many new courses and in particular the Division of Humanities and the Division of Industrial Cooperation. He also established the Institute's Graduate School.

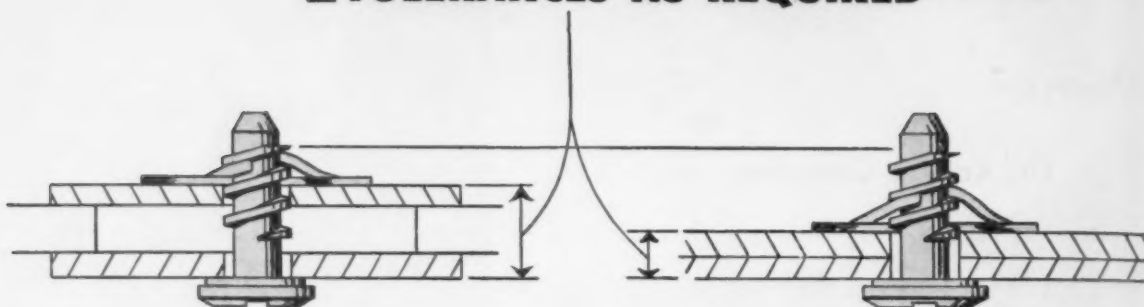


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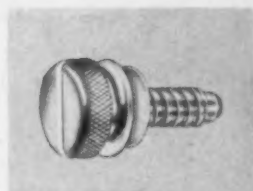


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# The Iron Age

## INTRODUCES

Semon H. Stupakoff, elected vice-president, **The Carborundum Co.**, Niagara Falls.

R. A. Carlson, appointed vice-president and manager of engineering, Rockford Clutch Div., **Borg-Warner Corp.**, Rockford, Ill.

Frank L. LaQue, elected vice-president of **The International Nickel Co., Inc.**, and manager of its Development and Research Div., New York; O. B. J. Fraser, and Donald J. Reese, become Assistant Managers of the Div.

Albert P. Heiner, becomes vice-president—public relations and traffic, **Kaiser Steel Corp.**, Oakland, Calif.

R. A. Carlson, promoted to vice-president and manager of Engineering, Rockford Clutch Div., **Borg-Warner Corp.**, Ill., and E. R. Williams, named sales manager.

Thomas J. McLoughlin, named vice-president, **Blocked Iron Corp.**, Albany.

Roy F. Hancock, promoted assistant vice-president, **Vanadium Corp.** of America, New York; and Frederick F. Franklin, named assistant district manager, Cleveland office.

Wirt Farley, becomes assistant to vice-president of sales, **Vapor Heating Corp.**, Chicago, and Lou A. Richardson, named Western District manager, San Francisco office.

Elmer P. Behrens, appointed Director of Purchases, **Royal Metal Mfg. Co.**, Chicago.

Robert C. Lohbauer, appointed to sales engineering staff, **Snyder Tool & Engineering Co.**, Detroit.

Richard G. Hartnett, appointed service engineer, Ohio, **Acheson Colloids Co.**, division of **Acheson Industries, Inc.**

William J. DeLancey, promoted to assistant general counsel, **Republic Steel Corp.**, Cleveland.

John P. Moorhouse, purchasing agent, elected director of purchases, **Standard Pressed Steel Co.**, Jenkintown, Pa.

W. Moody Childress, promoted to organization counselor, Administration Div., **U. S. Steel Corp.**

James W. Kettle, appointed controller, **Stauffer Chemical Co.**, New York.

A. B. Norton, general manager, Castings Div. will now also direct die casting operations, **Aluminum Co. of America**; and H. C. Erskine, named assistant general manager, Castings Div.

Ernest E. George, appointed manager of magnetic products engineering, **General Electric Corp.**

Nolan E. McDonald, becomes head of new Impact Extrusion Dept., **Magnesium Co. of America**, East Chicago, Ind.

Charles J. Adolph, Jr., appointed manager, West Coast office, **Kollsman Instrument Corp.**

Dean Valentine, appointed branch manager, Philadelphia, **Moore Products Co.**; and Richard C. Hopkins, becomes new branch manager, Pittsburgh.

Raymond C. Jones, named district sales manager, **DeWalt, Inc.**, Lancaster, Pa.

George Heard, appointed Pittsburgh district sales and service manager, **Dravo Heating Dept., Dravo Corp.**



MARSTON AMES, elected president, **W. Ames & Co.**, Jersey City, N. J.



STANLEY C. AMREN, becomes vice-president and general manager, **Cleveland Welding Co.**, subsidiary of **American Machine & Foundry Co.**



EDWARD H. WEITZEN, becomes vice-president in charge of marketing, **American Machine & Foundry Co.**, New York.

## Personnel

M. A. Straub, becomes assistant sales manager in charge of advertising and sales promotion, Atkins Saw Div., Borg-Warner Corp., Indianapolis.

John W. Mason, appointed district manager, Detroit office, Allen-Bradley Co.

John W. Schneider, becomes manager, Dearborn Iron Foundry, Ford Motor Co., and Harold C. Grant, appointed manager, Dearborn Specialty Foundry, Dearborn.

Edward C. Koester, appointed district manager, new Detroit District office, Wyckoff Steel Co.; James Steele, appointed sales representative, Philadelphia District sales office; Carl Polonus, appointed sales representative, Cincinnati District; Robert Bidaman, appointed to general sales office, Sharon; and Richard Connell, appointed sales representative, Sharon District.

Robert E. DePatie, appointed production and procurement manager, Industrial Sound Control, Inc., Hartford, Conn.

Joe Merlo, named advertising manager, McCulloch Motors, Los Angeles; and Charles D. Allis, named assistant general sales manager.

Paul D. Kaley, named textile sales manager, Fiber Glass Div., Pittsburgh Plate Glass Co.; Charles B. Keown, becomes manager of superfine sales; Albert W. Stevenson, appointed manager of New York district sales office; and Robert M. Hoffman, elected manager of Chicago district sales office.

R. H. Porterfield, named district office manager, Hartford; Allis-Chalmers Mfg. Co., General Machinery Div.; Aubrey Phillips, named Milwaukee office manager; D. R. Boise, named Houston office manager; and J. C. Lovelace, named Amarillo office manager.

Robert A. Rohn, appointed district sales manager, San Francisco office, Aluminum Co. of America.

Fenmore E. Dunn, becomes general manager, Worthington Corp., Vertical Turbine Pump Div.



R. H. MORSE, III, appointed assistant to the vice-president—sales, Fairbanks, Morse & Co.



MAXWELL D. MILLARD, appointed director of Distribution and Availability, U. S. Steel Corp., Pittsburgh.



STANLEY W. LOVEJOY, appointed manager, Cutting Tool Research, Pratt & Whitney, Division Niles-Bement-Pond Co.



JACOB J. JAEGER, appointed chief engineer, Machinery Engineering Dept., Pratt & Whitney, Division Niles-Bement-Pond Co.



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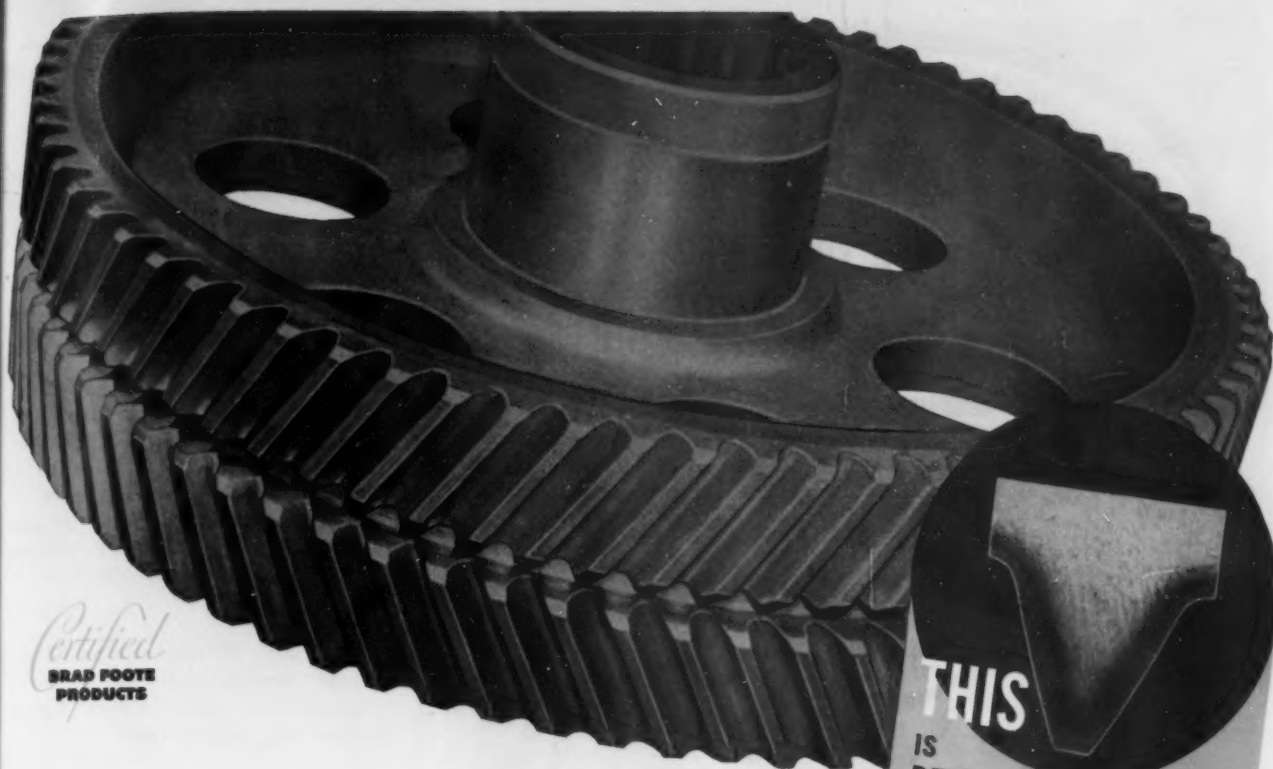
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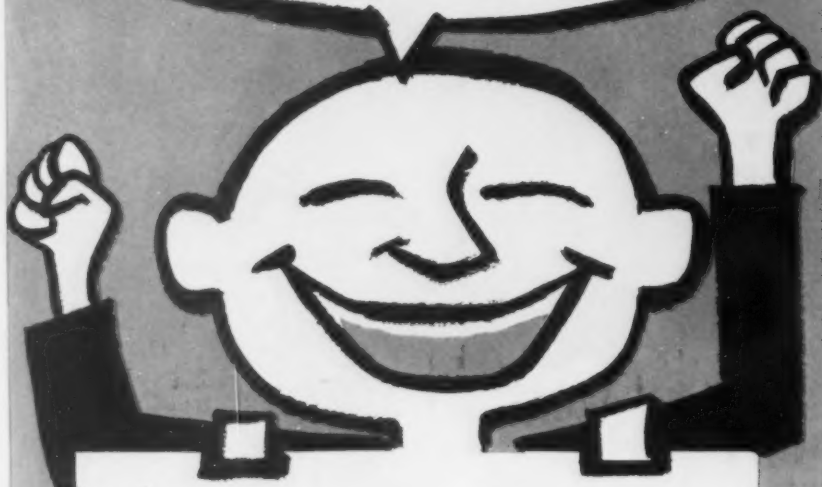
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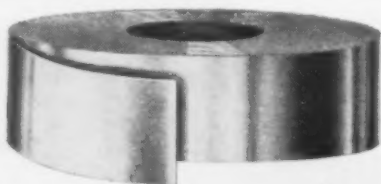
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## Personnel

*Continued*

Walter F. Donaldson, Jr., appointed assistant district sales manager, Jones & Laughlin Steel Corp., New York.

S. K. Derderian, appointed general manager, Metal Hydrides, Inc., Beverly, Mass.

Paul H. Wilson, named general superintendent, Ambridge plant, A. M. Byers Co., succeeding H. B. Linderman who has retired. Daniel A. Schmitt, appointed superintendent of rolling mills and assistant to the general superintendent. John F. Luzadre, becomes assistant superintendent, of rolling mills.

Joseph F. Hutchinson, named assistant general manager of Metal Products Div., The Goodyear Tire & Rubber Co., Akron, Ohio.

Gregory M. McKeown, appointed head of Product Service Dept., Vickers Inc., Detroit; and Philip H. Emrich, named manager of the Joplin, Mo., manufacturing plant.

Joseph H. Fallon, named Cincinnati District sales manager, Sterling Electric Motors, Inc., Los Angeles.

Ben H. Norrid, appointed sales representative in central and southern states, Inland Steel Products Co., Milwaukee.

Howard M. McNeil, appointed Wire and Cable Specialist, for Construction Materials Div., General Electric Co., Bridgeport, Conn.

Rod Davies, and Stuart Maise, appointed sales representatives, Wolverine Tube Div., Calumet & Hecla, Inc., Detroit.

## OBITUARIES

George T. Christopher, 66, former president, Packard Motor Car Co., recently at his farm near Columbus, Ohio.

C. Dudley Armstrong, 65, a director and former vice-president and secretary, Armstrong Cork Co., Lancaster, Pa.

Clarence Worthington Hamilton, 62, public relations director and administrative staff member, The Sheffield Corp., in St. Joseph's General Hospital, Little Current, Ont.

**Shatters oxide films—**

# Ultrasonics Improve Soldered Joints in Aluminum



By J. J. Obrzut  
Metal Finishing Editor

♦ Ultrasonic equipment powerful enough to effectively shatter oxide films helps to produce strong soldered joints in aluminum without using flux . . . Even anodized, alodized and similarly treated surfaces can be soldered by this method . . . Breaking up the tough oxides in the soldering zone permits the solder to alloy with the aluminum.

♦ Sound joints are obtained between all types of aluminum sheet, sand castings, diecastings, extrusions, tubing and wire . . . Aluminum can also be bonded to silver, copper, stainless steel and magnesium . . . A wide range of solder alloys can be used with the process.

♦ **SOUNDNESS** in soldered joints depends on how well oxides scale, dirt and other contaminants are removed from surfaces to be joined. Usually, this is done either by abrading the surfaces mechanically or by treating them chemically with a flux, or both. These practices can now be eliminated by using ultrasonic equipment which delivers enough high-frequency vibratory energy to effectively break up and remove tough surface films without the aid of flux.

Because the process requires no flux, thorough cleaning after soldering is not necessary and the

possibility of flux entrapment and corrosion is eliminated. This is particularly important in applications where corrosion must be avoided and joints must be leakproof.

One of the first metals to be soldered on a production basis by this process is aluminum. Sonobond equipment, recently developed by Aero-projects, Inc., West Chester, Pa., is sufficiently powerful to tin surfaces with heavy oxide coatings as well as those that have been anodized, alodized or treated similarly.

Aluminum sheet, extrusions, sand castings,



***The heart of the ultrasonic equipment is the transducer which converts electrical energy to high-frequency vibratory energy . . .***



ULTRASONIC soldering equipment is easy to operate. It consists of a high-frequency generator, soldering head, heating platen and stand.

diecastings, tubing, wire and busbars can be soldered to each other by this method. They can also be soldered to dissimilar metals as silver, copper and magnesium. The surfaces require no flux, but it is desirable to remove grease, oil and loose foreign particles with a suitable solvent before tinning.

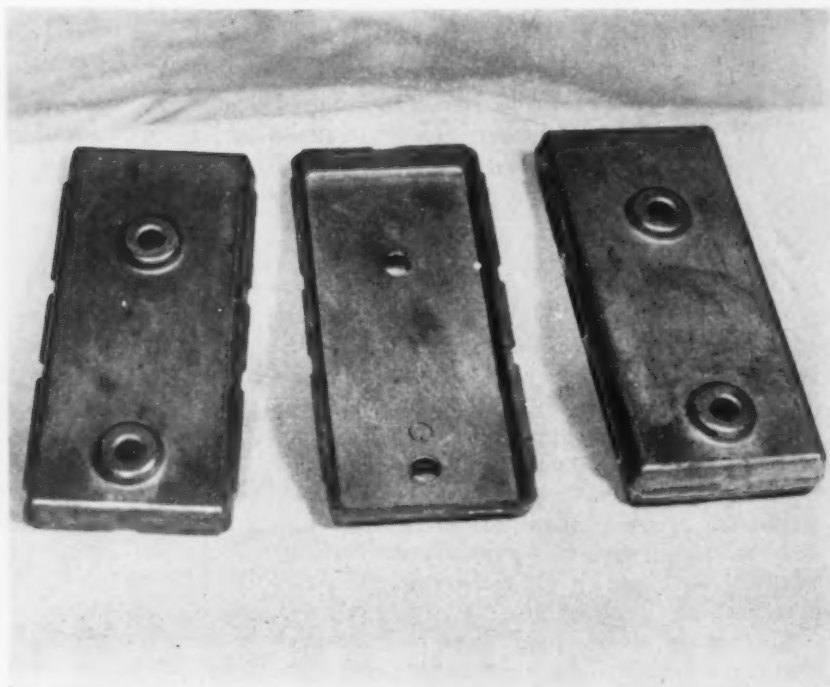
A wide range of tin-zinc and tin-lead solders can be used. Solders which have high tin content will tin aluminum very readily. Tin solders with as much as 5 pct aluminum, and the zinc-rich solders, work very satisfactorily for high-temperature applications.

The heart of the ultrasonic equipment is the transducer-coupling which delivers the acoustical energy to the soldering zone. It receives this energy from an electronic generator which converts ordinary 115-v, 60-cycle current into electrical power in the nominal frequency of 20 kc. This power is supplied to the transducer through a coaxial cable, and the transducer in turn converts the electrical energy into high-frequency vibratory energy.

The soldering head consists of the ultrasonic coupler and a soldering tip which is heated to a temperature close to the melting point of solder. A water jacket in the head prevents this heat from reaching the ultrasonic coupler. The soldering tip is not intended to supply the source of heat for the workpiece. It merely prevents chilling of the work.

Workpieces are heated by a platen or table equipped with strip heaters. The platen consists of a rectangular block enclosed in an insulated

DIECASTINGS soldered by ultrasonics have sound joints throughout. These withstood internal pressure of more than 100 psi without leakage.



## AVERAGE LOADS IN SOLDERED JOINTS

Material	Thickness, in.	Lap Width, in.	Solder	Average Load at Failure, lb	Average Shear Load, psi
24ST Bare	0.062	1/4	85Sn-15Zn	1748	9350
24ST Alclad	0.062	1/4	85Sn-15Zn	1565	8300
24ST Alclad	0.062	3/4	85Sn-15Zn	3008*	5300
24ST Alclad	0.062	3/4	50Pb-50Sn	1049	1870

\* Failure outside soldered joint.

frame. Temperature of the platen is regulated by a time control switch. Warm-up of the platen takes about 15 to 20 min.

Surfaces to be tinned are heated to slightly above the melting temperature of the solder. Solder is applied to the surface and the soldering tip moved gently back and forth, keeping the tip in contact with the solder. Violent action of the ultrasonic soldering head on the melted solder shatters and disperses the oxide coating on aluminum and allows the solder to alloy with a clean aluminum surface.

### Special tips speed work

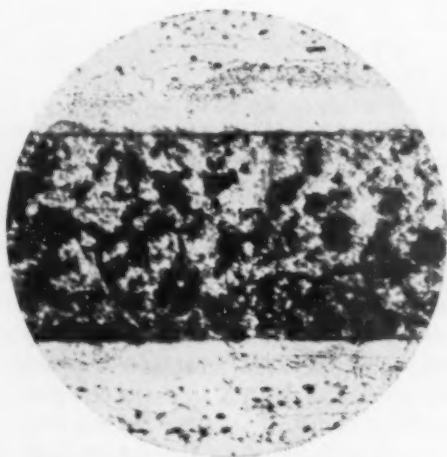
After tinning, surfaces to be joined should be placed together and the parts heated to slightly above the melting point of the solder. Moving the parts relative to each other while the solder is molten helps to achieve a continuous bond between the parts.

In production work, special soldering tips will speed soldering operations. For example if grooves are to be tinned in preparation for soldering wires or rods to them, a rounded tip matching the contour of the grooves should be used.

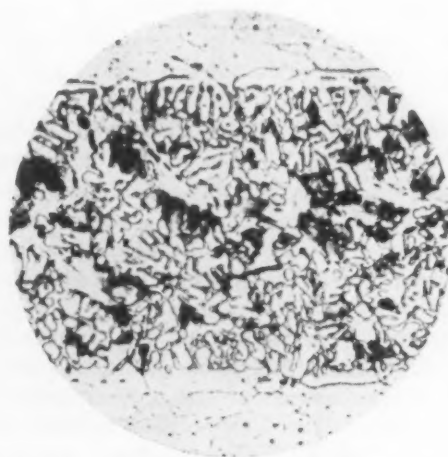
The soldering tip is made of copper which is silver brazed to the end of the stainless steel coupling rod. The tips gradually erode due to the same forces which break up and remove oxide films. At higher temperatures, they erode at a faster rate. Because of this erosion, tips require replacement from time to time.

In addition to soldering, the equipment can be used to fill holes in aluminum castings. If the casting is too large to be placed on the platen, the heated platen may be swung out of the way and the casting placed under the ultrasonic soldering head. Heat may then be applied by a torch, but care must be taken to avoid overheating the soldering tip.

Parts of various sizes, shapes, thicknesses and materials have been soldered satisfactorily. The process has been used for making sleeve-type joints in aluminum tubing and dissimilar metals. Copper, stainless steel and other metals have been soldered to aluminum busbars, and stiffening ribs have been bonded to lightweight sheet for greater strength. Still another example is the bonding of aluminum egg-crate filler to thin sheets for lightweight, high-strength sandwich board construction.



MICROGRAPH of typical soldered joint in aluminum shows soundness and continuity which insure high strength. No oxide film is present.



INTENSE ultrasonic activity shatters oxide film and permits solder to alloy with sheet. This micrograph shows ternary Sn-Zn-Al structure.

**In stainless steels—**

# Electrolytic Etch Cuts Corrosion Test Time



**By J. D. Roach**  
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Junior Metallurgist



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◆ Corrosion test time for some stainless steels can be sharply cut with a new electrolytic oxalic acid etch test . . . It indicates susceptibility to intergranular corrosion . . . In types 302, 304 and 316, test time can be cut from days to minutes.

◆ The test can also be used to show whether stabilized grades are completely stabilized . . . Stabilized grades of stainless cannot be tested for corrosion by the method because of sigma formation.

◆ A NEW, FASTER TEST method has substantially reduced the time required for determining susceptibility of some stainless steels to intergranular corrosion. Based on microstructure revealed by electrolytic etching in oxalic acid, the method can often cut testing time from days to a few minutes.

Accelerated corrosion tests are often used to determine susceptibility of stainless steels to intergranular corrosion. The most popular test is the boiling 65 pct nitric acid or Huey test. Fully annealed austenitic stainless steels are highly resistant to boiling 65 pct nitric acid. When sensitized, however, they lose weight depending on their susceptibility to intergranular corrosion.

With the new test, some unmodified austenitic stainless steels such as 304 may be evaluated for intergranular corrosion in about 15 minutes. Results obtained in the boiling 65 pct nitric acid test are based on 240 hr of exposure.

Basis for the new method\* is the type of microstructure revealed by electrolytic etching in oxalic acid, a standard agent used to show precipitated carbides in stainless steels. Although steel should not be rejected for plant service as a result of this test, steels *passing* it need not be subjected to the longer test, thus effecting a large saving in testing time.

This method is not recommended for stabi-

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\* M. A. Streicher, ASTM Bulletin, No. 188, Feb. 1953.



TABLE I

## STAINLESS STEELS TESTED

Type	C	Mn	Si	Cr	Ni	Mo	Ti	Cb	Al	Remarks
321	0.057	1.29	0.43	17.92	10.65		0.45		<0.01	Ti/C = 7.9
321	0.055	1.29	0.43	17.92	10.65		0.53		0.22	Ti/C = 9.6
321	0.056	1.56	0.57	17.97	10.73		0.40			Ti/C = 7.1
321	0.059	1.41	0.53	18.06	10.26		0.73		0.22	Ti/C = 12.4
321	0.059	1.17	0.51	17.72	9.36		0.55			Ti/C = 9.3
316	0.06	1.74	0.67	17.48	12.59	2.16				
304	0.07	0.42	0.20	18.73	8.93					
347	0.078	1.60	0.34	19.40	10.37			0.92		Cb/C = 11.8
321	0.059	1.50	0.27	19.96	10.48		0.55		0.050	Ti/C = 9.3
321*	0.061	1.37		18.00	11.12		0.28		0.33	Ti/C = 4.6

\* Heat 1315-2.

lized stainless grades 321 and 347. The effects of electrolytic etching in oxalic acid on the microstructure of these steels should first be determined and these effects compared to results from the boiling 65 pct nitric acid test.

Titanium stabilized steel, annealed, has a high resistance to nitric acid. But in the sensitized condition, resistance is low and erratic. This effect has been attributed to sigma phase formed from the delta ferrite rather than to precipitated carbides. Since the oxalic acid method depends solely on precipitated carbides, a comparison of the results from this test and the Huey test should indicate the usefulness of the latter method in detecting susceptibility of stabilized stainless steels, particularly type 321, to intergranular corrosion.

To compare the effects of oxalic and nitric acids in determining susceptibility to intergranular corrosion, several types of stainless steels, Table I, were tested. Two heat treatments, fully annealed and sensitized, were used. The fully annealed were water quenched from 2000°F and the sensitized were water quenched from 2000°F, then heated for 2 hr at 1250°F and air cooled.

#### Some resist attack

Specimens for the boiling nitric acid test were surface ground to a 120 grit finish, measured, weighed, and tested according to ASTM A 262-52T. Five 48-hr testing periods were used except when extremely high corrosion rates were obtained, then only three periods were used.

For the electrolytic test in oxalic acid, the surface to be examined is polished with No. 000 emery paper and then made the anode in an electrolytic cell. The electrolyte is a 10 pct solution of oxalic acid in distilled water. The

cathode is a piece of 0.060-in. 18-8 stainless steel.

The apparatus consists of a variable resistance in series with the anode and a direct current ammeter to aid in calculating current density. A current density of approximately 1 amp per sq cm was maintained. Etching time varied according to the type of steel tested.

#### Rate of dissolution varies

After etching, specimens were examined microscopically at 250 to 500 diam and classified according to structure. Ditch, step and dual type structures were noted. In the ditch type structures, etching formed ditches at the grain boundaries where the chromium rich carbides had been removed. These ditches, Fig. 1, completely surrounded the grains. In the step structure, etching results in grain face dissolution when carbides are in solution. The rate of dissolution will vary with grain orientation causing the formation of steps at the grain boundaries, Fig. 2. The dual structure contains both the steps and intergranular ditches. The ditches, however, Fig. 3, do not completely envelop the grains.

Because the ditch structure indicates presence of chromium carbides in the grain boundaries, the sample showing this structure should show a high corrosion rate in the boiling nitric acid test. A step structure shows carbides are in solution and a low corrosion rate in nitric acid should be obtained. The dual structure should also indicate a low corrosion rate since the ditches only partly surround the grains. As a result the grains are not readily undermined.

Corrosion rates in the boiling nitric acid test, and the results of the electrolytic oxalic acid etch for fully annealed steels are shown in Table II. The results on the same steels in the

**After etching, specimens were classified according to structure . . . Ditch, step and dual type structures, each a clue to the rate of corrosion, were noticed . . . Test results compared . . .**



FIG. 1—Ditch structure resulted from dissolving of chrome carbides at grain boundaries. X500



FIG. 2—Step structure indicates general attack and lack of carbides at grain boundaries. X250

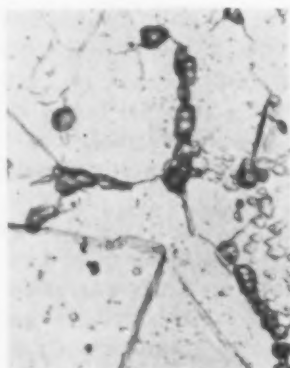


FIG. 3—Dual structure shows partial carbide precipitation at the grain boundaries. X500

sensitized condition are shown in Table III.

The fully annealed steels, with one exception, showed a step structure after electrolytic etching. The exception, a 321 steel, had a dual structure. In either case, the corrosion rate in boiling nitric acid would be low, indicating resistance to intergranular attack. The result of the Huey tests, averaging 5 48-hour periods, agree with results expected from the appearance of the microstructure.

Corrosion rates for types 302, 304, and 316 are all below the commonly accepted maximum established for the nitric acid test and therefore would not be susceptible to intergranular corrosion. The corrosion rates on the stabilized grades, types 321 and 347, were low, but somewhat higher than the nonstabilized grades. Maximum nitric acid corrosion rates have not been established for the stabilized grades. However, microstructures obtained on these after etching in oxalic acid indicate they are immune to intergranular attack, and are confirmed by the Huey tests.

Further testing of sensitized specimens showed the oxalic acid test is reliable in predicting susceptibility to intergranular attack of types 302, 304 and 316 stainless steels. These steels, annealed, showed a step structure and a low corrosion rate in nitric acid. A ditch structure, obtained after sensitizing, indicates the steels are susceptible to intergranular attack. The Huey test confirms these results by showing corrosion rates considerably above the maximum allowed.

With the stabilized grades, in the sensitized condition, the microstructures obtained on etching in oxalic acid were not indicative of the corrosion rates obtained in boiling nitric acid. These steels showed either a step or dual structure after etching, indicating they are not susceptible to intergranular attack. High corrosion rates obtained on these steels in the Huey test show the opposite to be true.

#### **One shows dual structure**

One stabilized grade, Heat 1315-2, showed a ditch structure after etching in oxalic acid revealing the presence of precipitated chromium carbides at the grain boundaries. Chemical analysis indicates a low titanium to carbon ratio 4.6 to 1, suggesting complete stabilization had not been obtained and carbide precipitation could occur during sensitizing. Thus, the oxalic acid test may be useful in determining if complete stabilization has been obtained through the addition of titanium or columbium.

Results on stabilized grades prove that it is

TABLE II

**CORROSION TEST RESULTS  
ANNEALED STAINLESS STEELS**

AISI Type	Corrosion Rate, ipm*	Structure in Oxalic Acid Etch
321.....	0.00397	Step
321.....	0.00391	Step
321.....	0.00214	Step
321.....	0.00543	Step
321.....	0.00155	Step
316.....	0.00104	.....
304.....	0.00128	Step
347.....	0.00226	Step
321.....	0.00363	Step
321**.....	0.0109	Dual
302.....	0.00119	Step
316.....	0.00066	Step

\* Average of five 48-hour periods.

\*\* Heat 1315-2.

TABLE III

**CORROSION TEST RESULTS  
SENSITIZED STAINLESS STEELS**

AISI Type	Corrosion Rate, ipm**	Structure in Oxalic Acid Etch
321.....	0.0641	Dual
321.....	0.0274	Step
321.....	0.0528	Dual
321.....	0.2138	Step
321.....	0.0138	Step
316.....	0.1203	Ditch
304.....	0.0084	Ditch
347.....	0.0075	Step
321.....	0.0640	Dual
321*.....	0.0478	Ditch
302.....	0.0122	Ditch
316.....	0.0711	Ditch

\* Heat 1315-2.

\*\* Average of three 48-hr. periods.

not correct to assume that low resistance to general attack by boiling nitric acid is an indication of susceptibility to intergranular attack. With the standard 18-8 grades, Huey test data can be correlated with service tests so the above assumption has some basis. No such correlation has been reported for the stabilized grades.

Generally, the stabilized grades of stainless steel are considered less resistant to boiling nitric acid, but they are more resistant in many corrosive media than the regular 18-8 when both are free from intergranular susceptibility. This is particularly true for the titanium stabilized grade, type 321, which, after sensitizing, has a rather low and erratic resistance to boiling 65 pct nitric acid. This behavior is characteristic of this particular concentration of nitric acid since previous work showed that the corrosion rate of type 321 steel, in the sensitized condition, decreased markedly as the concentration of the acid is lowered from 65 to 35 pct.

#### Some show little difference

In solutions of 45 pct boiling nitric acid or less there is little difference in the corrosion resistance of types 304, 347, or 321. These results also show that it is not safe to judge resistance to other corrosive media from the results obtained in boiling 65 pct nitric acid. The Huey test should not be a general acceptance test for all stainless steels in all corrosive media.

The results of the oxalic acid test show that the low resistance of sensitized type 321 steels to 65 pct boiling nitric acid is not the result of chromium carbide precipitation at the grain boundaries. This substantiates previous work

which showed that the presence of sigma phase is responsible for the high corrosion rate of titanium stabilized steels. This sigma, formed from delta ferrite on sensitizing at 1250°F, is readily attacked by 65 pct nitric acid.

#### Influence of titanium, aluminum

The transformation of delta ferrite to sigma is influenced by titanium and aluminum content. Extent of sigma transformation increases as aluminum content increases. A number of steels tested contained high aluminum. These showed high corrosion rates in nitric acid despite oxalic acid test results showing these steels to be resistant to intergranular attack. Microscopic examination of these steels indicated presence of sigma phase. The formation of sigma on sensitizing type 321 steels can be reduced, through appropriate preliminary heat treatment, to yield acceptably low corrosion rates in the Huey test.

The Huey test is unsuited for evaluating the tendency toward intergranular corrosion of type 321 steel. The electrolytic test is also ineffective for predicting corrosion rate of this type steel in 65 pct boiling nitric acid since the oxalic acid test depends on precipitated chromium carbides, while the corrosion rate of this type steel in this particular medium is governed by the quantity of the sigma phase present in the steel.

The electrolytic oxalic etch test is an effective method for detecting susceptibility to intergranular corrosion in types 302, 304, and 316 stainless steels. Results can be related to the corrosion rate obtained in the 240 hour nitric acid test, and these stainless steels can be screened from the longer test.



## "Self Insurance" System

- ◆ This company found that its high lost-time accident rate had boosted insurance premiums sharply . . . Management set up its own reserve fund to cover accident expense, simultaneously launched a vigorous safety campaign . . . Lost-time injuries and clinic visits have dropped steadily although employment has more than doubled.
- ◆ Supervisors and workers have their own safety committees, cooperate fully in frequent plant inspections, departmental meetings . . . Employees are taught safe practices from the day they're hired . . . Injured workers are rehabilitated, often have a unique value to the company and fellow employees.



By M. M. Clancy  
Safety Engineer  
Ryan Aeronautical Co.  
San Diego, California

◆ SAFETY engineering pays off, not only in lives and limbs saved, but in dollars and cents to company management. When the cost of industrial accidents is borne by the company instead of an outside insurance carrier, improved safety becomes sharply impelling.

A rising curve of lost time accidents at Ryan Aeronautical Co., San Diego, Calif., reached a peak in 1948 and 1949. Insurance premiums, based on experience factors, had climbed rapidly. After a critical appraisal the company instituted a "self-insurance" system to bear all industrial accident expenses.

### Reserve fund necessary

An adequate reserve fund was established to meet requirements of the California Industrial Accident Commission. An outside concern was chosen as administrator to supervise the payment of claims, conduct investigations and provide legal counsel for litigation before the Industrial Accident Commission's referee.

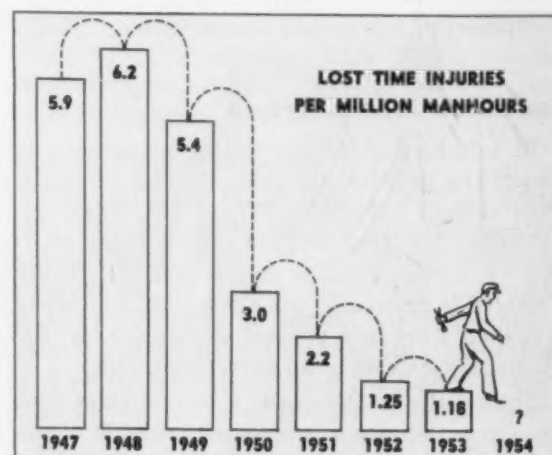
Most accident cases are settled by agreement between Ryan and the employee, with Commission approval of the monetary award. The administrator proposes a settlement which the employee can accept or reject. If it is rejected, the Commission referee conducts a hearing and recommends an award.

When "self-insurance" went into effect June 1, 1949, a vigorous safety program was launched. Results have been noteworthy. In 1948 the number of lost time injuries per million manhours worked hit an all-time high of 6.2. At that time there were about 1746 employees, most of them old-timers. In 1953, with more than 4350 workers, the number of lost time injuries per million manhours dropped to 1.18.

Average number of clinic cases per month per 100 employees also dropped to a new low of 0.92 in 1953 compared with 1.60 in 1948 and 1.66 in 1949. These refer to accidents requiring treatment by a doctor. And the number of lost time accidents dropped from 23 in 1949 to only 11 in 1953, when employment was more than double.

This gratifying improvement in safety was not accomplished with fanfare, flamboyant slogans or offers of prizes. It was achieved by making all employees safety conscious through an unrelenting workaday routine. Because safety is basically a state of mind, the company tackled it as a day-in, day-out problem.

At the core of the accident prevention program are two types of in-plant committees, (1) supervisors' safety committees, and (2) a workman's safety committee.



COMBINATION of "self-insurance" and vigorous safety program slashes lost-time injury rate.

# em Improves Safety Record

The supervisors' committees make thorough plant inspections each month, checking on unsafe practices and the need for improved housekeeping. Sixteen supervisors are divided into groups of four, and each group is accompanied by a safety engineer.

To avoid oversights, the supervisors inspect areas other than those in which they are customarily stationed. The groups listen to worker complaints and are sharply critical as they observe equipment, working habits, housekeeping and use of personal safety devices.

A complete record of these observations is made by a secretary who accompanies the groups. Copies are distributed to all supervision for immediate attention and action. The safety engineering department makes certain the recommended corrections are made.

All supervisory personnel, from the vice-president of manufacturing to the newest assistant foreman, attend a monthly safety meeting. Experiences of the past month are reviewed and techniques to reduce accident-proneness are compared. Safety films are provided by the National Safety Council and other organizations.

Personal interest in such meetings is promoted by appointing a different supervisor as co-chairman each month. The supervisor is responsible with the safety engineer for the success of the session.

But accident prevention is not a program that can be imposed from the top down. Since most industrial mishaps occur among hourly paid workers, their ideas on hazards and safety

measures are essential. To provide a channel for such ideas, a workman's safety committee was established. It consists of three union representatives and the plant safety engineer. This group tours the plant each week. Written reports of findings are reviewed once a month, followed by recommendations for specific action.

Recently, the exchange of ideas between supervisory personnel and hourly paid employees has been improved by monthly departmental safety meetings. An entire department takes 10 or 15 minutes of company time after a regular rest period to discuss accident prevention and better housekeeping.

## Indoctrinate new workers

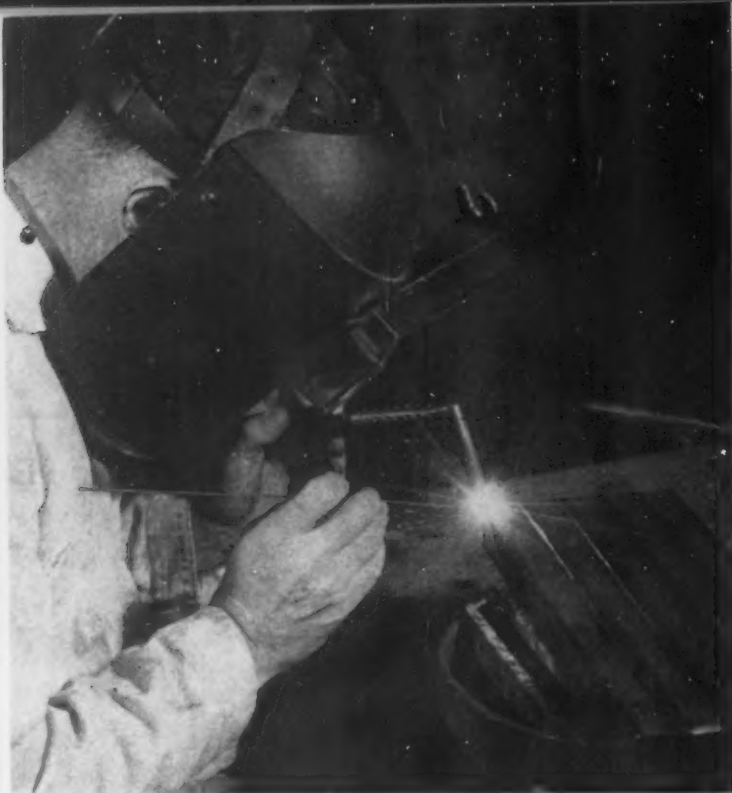
Safety training of an employee starts early. On his first day on the job, he is impressed with the inherent hazards if his work is not performed as instructed and if proper protective equipment is not used.

The company is interested not only in accident prevention, but in the rehabilitation of injured employees. A worker recovered from his injuries may have a unique value to the company.

For example, one employee had lost four fingers of his left hand while operating a punch press. After he recovered he was placed in charge of punch press setups. To make certain that others will not be injured as he was, he carefully checks die and punch fastenings, guard cages, safety valves, and all other safety precautions.



HOW IT FEELS to be accidentally blinded is brought home in supervisor's safety meeting.



INDIVIDUAL CHANNELS welded into duct assembly are intended for pressures up to 100 psi. In tests, they stood 375 psi before failure.

With or without chamber—

## Titanium Fusion Welded on Production Basis



By L. Barrett  
Senior Manufacturing  
Research Engineer



H. D. Justis  
Manufacturing  
Research Engineer

The Glenn L. Martin Co.  
Baltimore

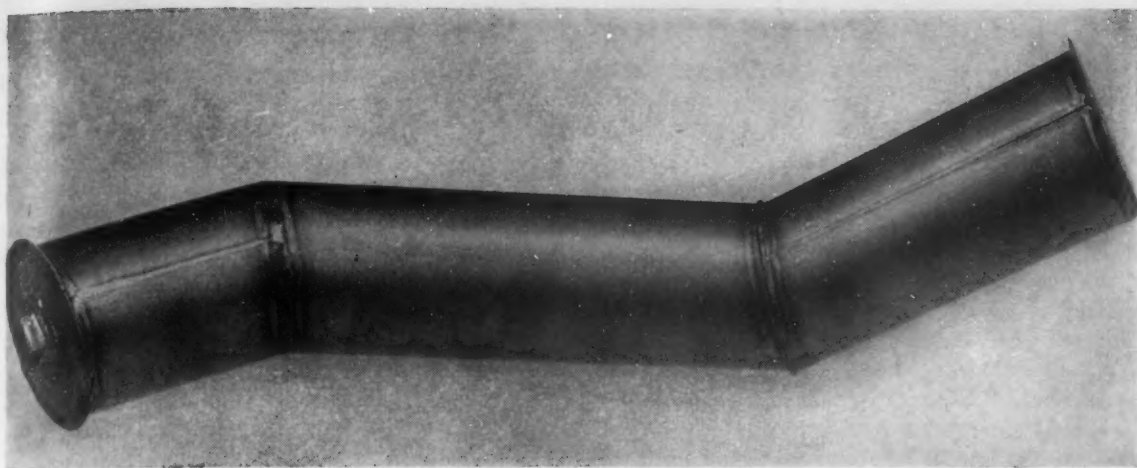
♦ Growing use of titanium in aircraft prompted The Glenn L. Martin Co. to undertake a study which would establish the best techniques for production line welding . . . Inert gas-shielded welding was adopted because of its better protection of the weld zone against atmospheric contamination.

♦ Argon, providing a stabler arc, is used to shield the molten weld puddle while helium is used for backup and for welding in a chamber . . . Metal backing for thin sections is either aluminum or copper since neither picks up titanium . . . Jigs and fixtures serve dual purpose—for holding and backing.

♦ GREATER USE of titanium in aircraft has pointed up the importance of establishing fabricating methods to improve and speed production techniques. The Glenn L. Martin Co., Baltimore, undertook a research and development program to accomplish this, and from the experience gained has been able to set up a production line for fusion welding titanium.

The difficulty in welding titanium is that at temperatures above 1400°F it has a tendency to absorb oxygen, nitrogen and hydrogen from the air. This results in cold embrittlement. On cooling, the metal becomes brittle and loses ductility. Therefore, at these high temperatures it is necessary to protect the molten weld puddle and the adjacent hot metal from atmospheric





**UNDER TEST**, this 4 1/2-in. titanium tubular section withstood pressure of 600 psi before it

ruptured across the weld of mitered joint. Longitudinal seams were welded automatically.

contamination. One way to accomplish this is to exclude undesirable air from the affected area by an inert gas. Thus, the inert gas-shielded welding process, using a nonconsumable tungsten electrode, was adopted.

Inert gas-shielded welding can be applied by two techniques. The first involves welding inside a chamber filled with a controlled, inert gaseous atmosphere—in most instances helium. This method is preferred for small parts, or when the design of the part makes it difficult to provide tooling for welding outside the chamber.

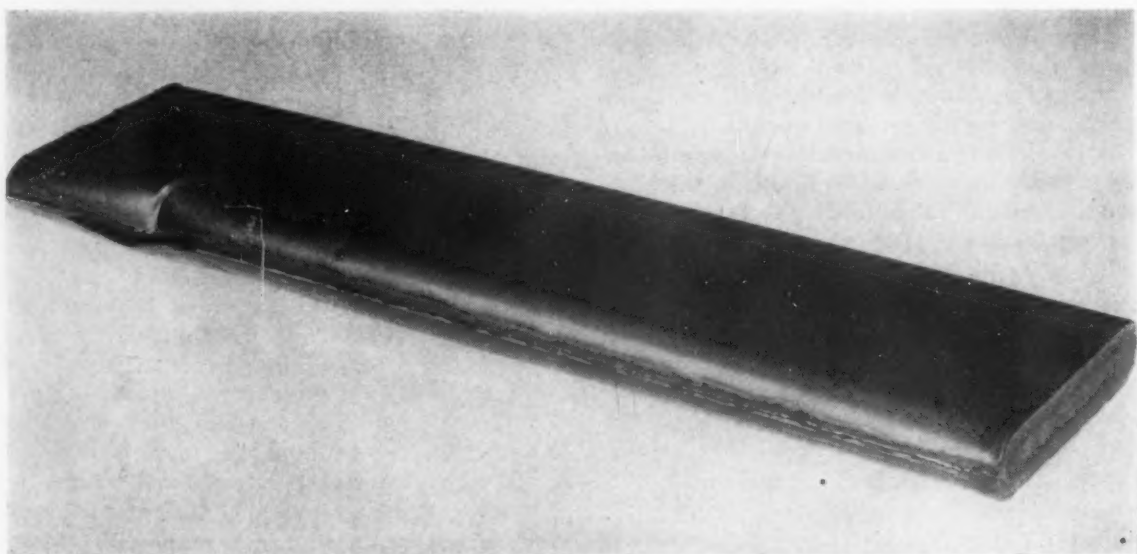
The other method—and the one most frequently used—is applicable under normal atmospheric conditions. The hot metal and adjacent critical areas are protected from the air by passing a larger volume of inert gas through a standard tungsten arc welding torch equipped with a large size nozzle.

For added precaution, either metal or inert

gas backup is used depending on the joint design and thickness of material to be welded. Helium is usually used for heavy-gage panels and metal backup for the thinner gages. Aluminum and copper are the two metals used since neither will pick up titanium. Copper does not mar too readily and is easy to clean.

Argon is most frequently used as the shielding gas that flows through the torch since it is quite stable under the arc. However, it is more expensive than helium. For this reason, helium is generally used for backup and for welding in closed chambers.

Tests were conducted to determine the physical properties of titanium after fusion welding. Test panels were made of commercially pure titanium ranging in thickness from 0.020 to 0.102 in. Welding was done by shop welding operators, using standard welding equipment in a normal atmosphere. RC70 titanium was the panel base material. Filler was TI-75A.



**TEST SECTION** of thin titanium ducting, welded manually, was deflected 2 11/16 in. under pres-

sure before bursting along welded seam. The 0.020-in. thick sheet withstood 27 1/2 psi.

## **Tooling is important to weld titanium successfully. Jigs and fixtures should serve both for holding and backing of joints . . .**

After welding, test panels were stress relieved at 950°F. Standard tensile and bend test coupons were then cut from the panels and prepared for testing. All specimens tested failed in the base metal.

Bend test specimens were bent over a 10T diameter to 180°. All specimens in this lot were bent without any failure. In previous bend tests, smaller bend radii were used but most specimens under 10T diameter failed before a 180° bend was reached. Material used in these tests was 0.090 to 0.102 in. thick. Thinner materials can be bent to smaller radii satisfactorily.

Several welded titanium assemblies simulating those in actual production were fabricated to obtain test data for potential use in engineering designs. One of these was a section of ducting for low-pressure operating conditions. Its cross-section is oval, measuring about 1¾ in. across the flat by 8 in. wide. The material was 0.020 in. thick RC70 titanium sheet.

### **Plugged ducts confine helium**

The section was made by forming the two halves so as to produce a flange about 1/16 in. high when the two halves were tack-welded together. To prevent oxidation on the inside during welding, the ends were plugged with wooden blocks cut to fit. One block had a ¼-in. hole drilled in it to introduce helium into the duct during welding. For added protection against contamination on the outside, copper bars were clamped alongside and parallel to the longitudinal seam.

Welding was done manually, using standard inert gas-shielded welding equipment. Argon was used through the torch while a flow of helium was maintained through the duct. After the two halves were welded together, titanium plates were welded on each end. A machined titanium fitting was welded on one end to attach an air line for pressure testing.

In fabricating another section of round ducting of 0.020 in. thick RC70 titanium, the sheet was sheared and rolled into a 4½-in. diam, then butt welded in a special fixture. The fixture consisted of two copper hold-down bars mounted

on an angle-iron stand. A copper tube, slightly less than 4½ in. in diameter, was inserted inside the rolled titanium sheet. This copper tube served as part of the fixture for holding the titanium tube in place and as backup for welding the joint.

After the copper tube was inserted in place, it was clamped in the fixture so as to align the abutting edges of the titanium tube between the bevelled edges of the copper hold-down bars. Automatic inert gas-shielded tungsten arc welding was used to weld the tube without the addition of filler metal. Welding speed was about 20 ipm, argon flow through the torch was 25 cfh, and welding current was 40 amp dc.

The tube was welded, then cut into three sections. The cuts were made to produce mitered joints. These joints were fitted and welded manually. To protect the inside of the joint from contamination, the tube ends were plugged with wooden disks. A ¼-in. hole drilled in the disks permitted a continuous flow of helium through the tube during welding.

After the mitered joints were welded, plates were welded to each end of the assembly for the purpose of pressure testing. At 275 psi, one end plate burst open. This was caused by the end plates being of too light a gage. These end plates were cut off and replaced with thicker material. The duct was then retested. This test, carried out in steps of 50 psi, reached a pressure of 600 psi before the duct failed across the weld on one of the mitered joints.

### **Aluminum bars provide backing**

A third type of ducting was made of five individual channels with square cross-section which were assembled and welded into a unit. This ducting is intended for operating pressure of about 100 psi. The material for this duct was 0.025-in. RC70 titanium sheet.

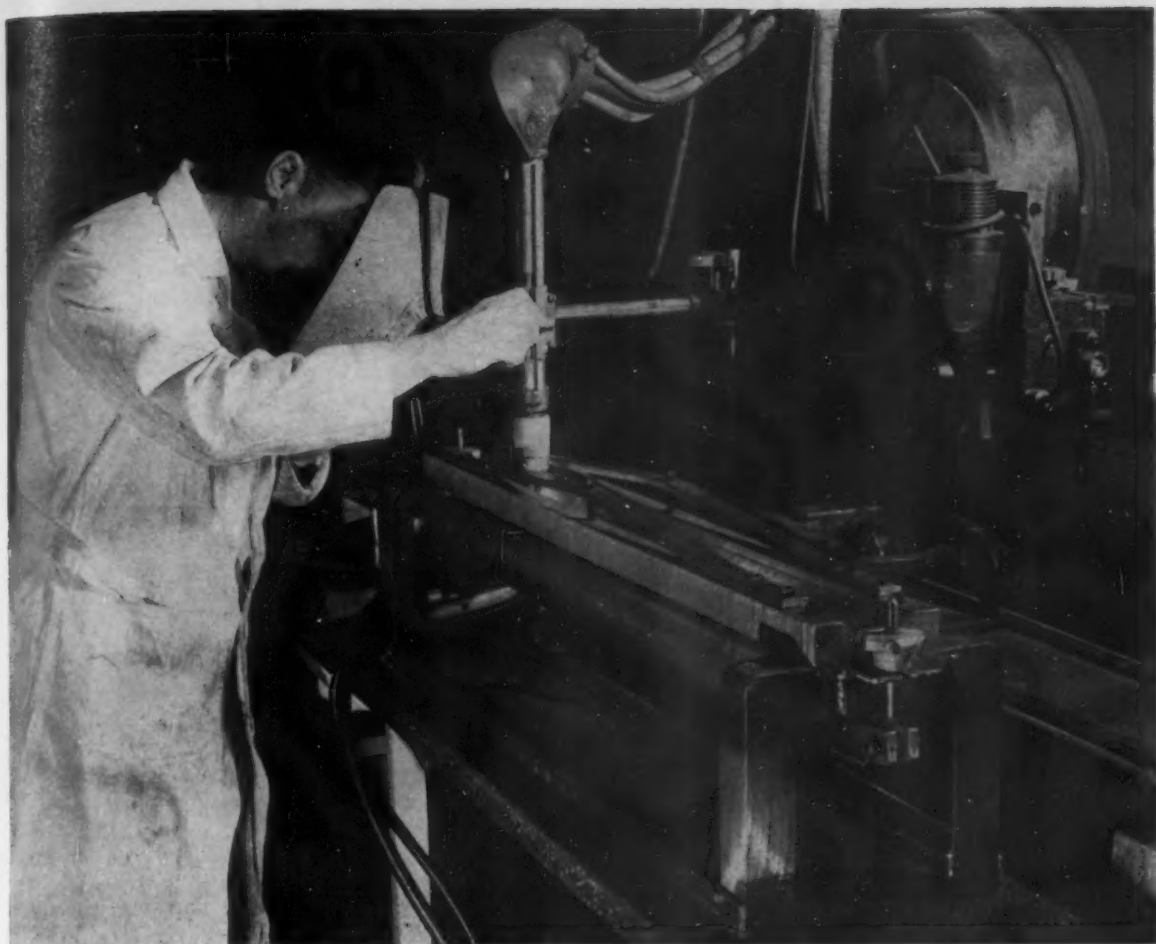
Welding was done manually, using RC55 filler material and argon flow through the torch at 17 cfh. For backup, aluminum bars were machined to fit inside of each channel. A ½-in. hole was drilled longitudinally through each bar and small 0.050-in. diam holes were drilled diagonally from one corner of the bar to the ½-in. longitudinal hole. Helium, introduced into the larger hole, was distributed to the back side of the weld joint through the smaller holes.

The aluminum backup bars served two purposes: (1) for aligning the channels and (2) as a combination backup of metal and helium.

After the longitudinal welds were made, the assembly was sectioned through the center to make a mitered joint. To protect the mitered joint against contamination, plates were tack-welded at each end. Helium at a flow rate of 20

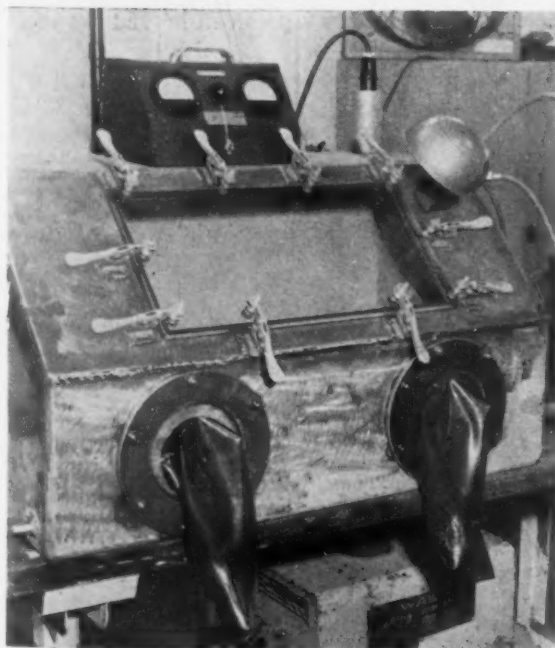
### **RESULTS OF PRESSURE TEST**

Air pressure, psi	Cross section	
	across flat, in.	Deflection, in.
0	1¾	
2	2⅞	1⅞
4	3⅞	1⅞
5	3¼	1½
6	3⅞	1⅞
7	3 7/16	1 11/16
10	3 11/16	1 15/16
13	3 13/16	2 1/16
18	4⅞	2⅞
23½	4 7/16	2 11/16
27½	Duct failed along welded seam.	



HIGH-PRESSURE tubular ducting being welded automatically by inert gas-shielded process.

Copper tube placed inside the titanium tube serves as holding and backing fixture.



WELDING CHAMBER filled with inert atmosphere is used mostly for welding small parts, or for parts which would require difficult tooling.

cfh was then introduced to the inside of the duct.

When welding was completed, the assembly was tested under pressure for leaks. The results at various pressures were:

Pressure, psi	Deflection, in.
75	0
100	0
250	1/16
300	3/32
350	1/8
375	Leak in weld at mitered joint

These applications made it apparent that titanium can be welded successfully with standard equipment either in a protective chamber or in a normal atmosphere. Test results exceeded the original requirements for these assemblies. The physical tests also proved that the strength of the parent metal can be obtained in the welded joint.

Tooling is important to successful welding of titanium. Jigs and fixtures should be designed to serve as a combination holding fixture and backup for the joints. Design for the back-up feature is critical since it must provide for good protection at the backside of the weld.



**Rack forming—**

## Develop New Method for Cold Rolling Splines

- ◆ A new cold rolling technique developed by Michigan Tool Co. for splines, grooves and serrations promises better surface finish, a reduction for hobbing and complete elimination of chip disposal.
- ◆ Other advantages include favorable prestressing of the shaft, higher torsional strength, better tool life, greater output per machine.
- ◆ Interest in the new cold forming process by automotive producers is high . . . Important savings in steel requirements are possible . . . This versatile new method can be readily adapted to automation.



**By W. G. Patton**  
Asst. Technical Editor

◆ **ROLLING**, a basically different approach to the problem of cold, chipless forming of splines, oil grooves, serrations and similar shapes has been developed by Michigan Tool Co. The first of a series of powerful Roto-Flo spline roller machines was recently announced. This is probably the first successful attempt to form splines cold using a rack forming method.

Developed after a research program extend-

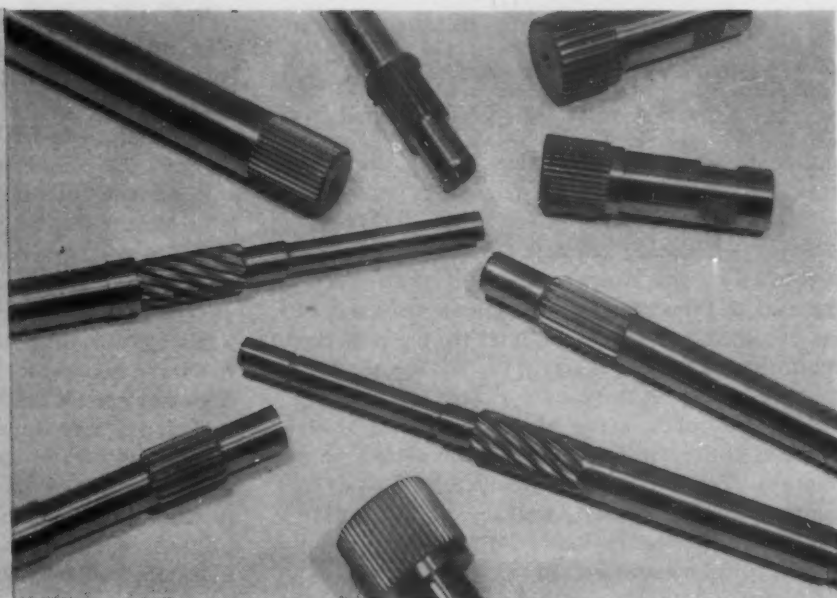
ing over several years, the new machines are reported to form splines accurately on shafts up to 30 times faster than conventional hobbing.

Other advantages favoring the new method of cold rolling splines include improved surface finish, longer tool life, high torsional strength, increased production per sq ft of floor space, increased productivity per man-hr and the com-



**SPLINE ROLLER** used for roll forming splines, oil grooves, serrations and similar shapes.

**FORMING TIME** for these splined shafts averaged 3.5 sec. Diameters range from  $\frac{7}{8}$  to  $1\frac{5}{8}$  in. OD. Straight splines at top are formed adjacent to protruding shoulders.



plete elimination of the problem of chip removal.

The machine is fully adjustable. Experience to date indicates that up to 200,000 splines can be rolled before tool resharpening is required. It is expected that forming racks made of high carbon-high chromium steel will permit 3 sharpenings before replacement is necessary.

Typical of production experience to date with these new machines is rolling of  $1\frac{1}{8}$  in. diam splined shafts  $1\frac{1}{4}$  in. long in only 3 sec. Return stroke of the machine requires 2 sec. Assuming a requirement of 4 sec for automatic handling of the part, the entire cycling time will be less than 10 sec.

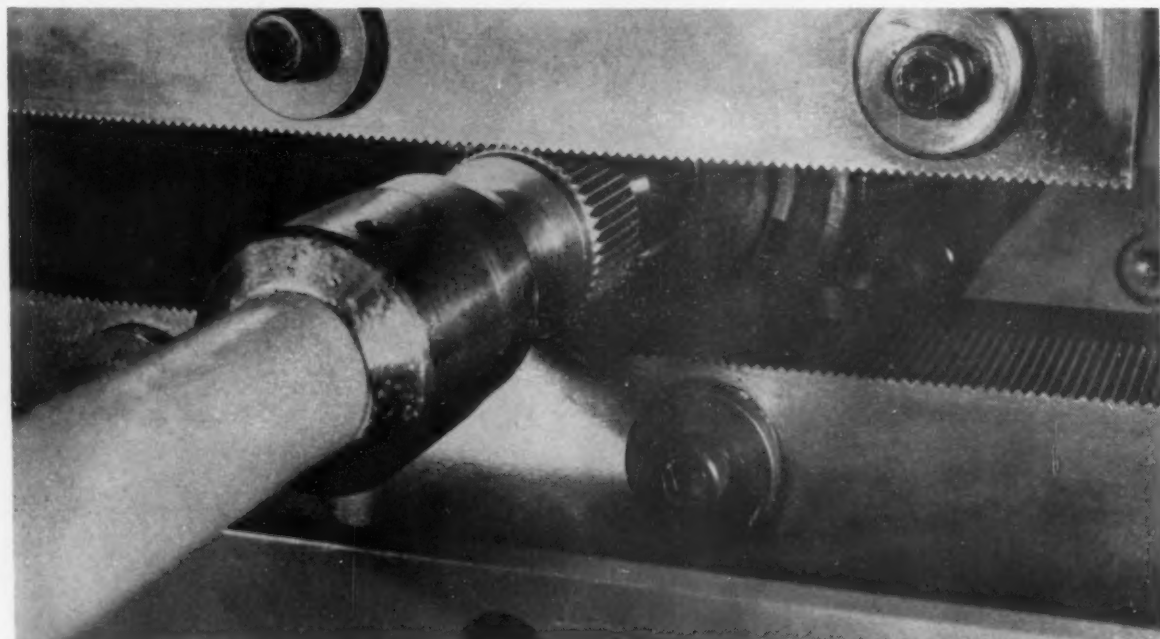
The above parts were rolled from a SAE 1037 steel. Hardness of the steel ranged from an-

nealed hardness to 41 Rockwell "C." Surface finish obtained was 3 to 6 microinches. Accuracy of the part was within 0.0008 in. variation from part to part over pins.

Basic components of the Roto-Flo machine include two hardened rack-type forming tools and two slides. The machine frame is an extremely heavy "C" shape.

The two slides, holding the forming racks, are mounted one above the other. Slides are geared together with two non-forming master racks and a connecting gear. The lower rack is the prime mover. Hydraulic cylinders supply necessary power. Racks of the initial machine built by Michigan Tool Co. are 25 in. long.

The tool racks are adjustable toward the part



**ROLLING** experimental axle shaft spline. Forming racks are high carbon, high chrome steel.

**"New cold forming methods are  
of high interest in Detroit . . ."**

center to obtain proper size. Racks are also adjustable endwise to gain correct relationship with the part axis.

After positioning between the racks, the shaft is rotated by the lateral movement of the forming racks. Fine starting serrations are used at the beginning of the rack. Starting teeth at the beginning of both racks grip the shaft and start it rolling between the rack-forming teeth.

A few seconds after placing a metal shaft between the forming racks, a completed part emerges. Teeth can be formed at any desired position on the shaft. Accuracy of the spline can be very closely held. Both straight and helical splines have been produced successfully.

In contrast to certain hobbed splines which require that a bar of steel equal to the greatest diameter of the finished part must be used, a spline-rolled shaft with a single spline requires a steel bar equivalent only to the pitch diameter of the spline. A potential saving in machining time required prior to forming the spline as well as tremendous time savings during formation of the spline are possible using the Roto-Flo method.

Because of its outstanding simplicity and versatility, it is expected there will be many design advantages using the new cold forming method. Such an advantage is ability to form all the way up to a protruding shoulder diameter. The shoulder is not damaged in any way during forming of the spline and greater strength and better bearing surfaces are obtained.

Photomicrographs of sections taken from

spline teeth formed by the Roto-Flo cold forming method show an interesting flow of the grain structure with the contour of the tooth form.

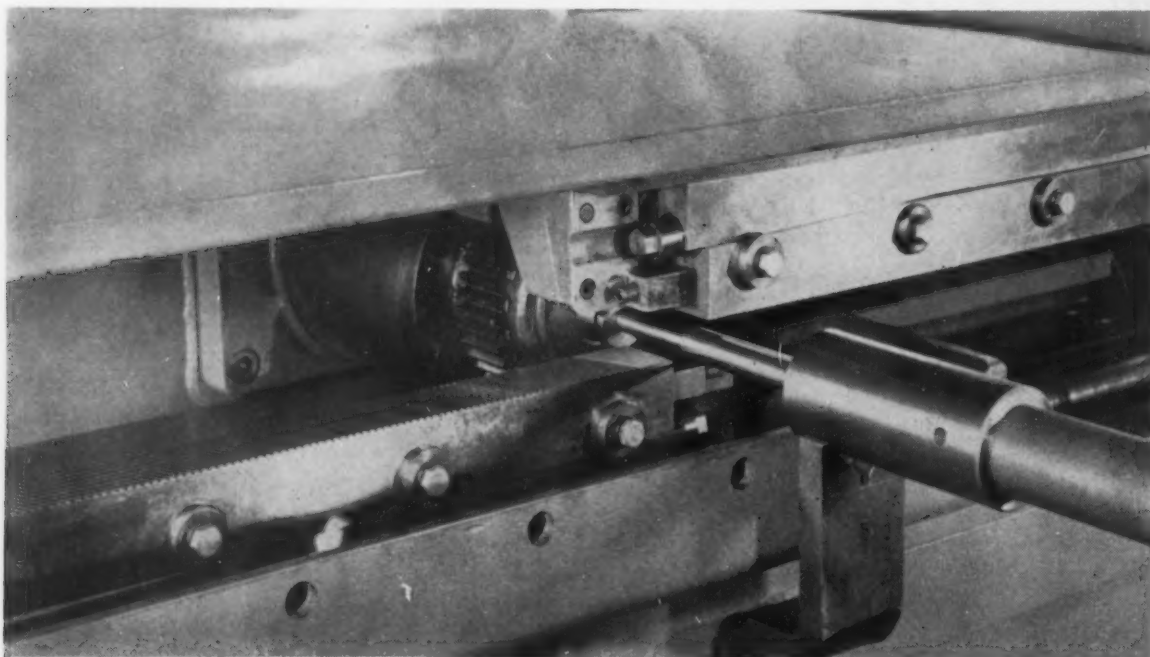
Several tests have indicated that parts produced with rolled rather than hobbed or shaped splines will withstand higher torsion loads for equivalent shaft sizes. One result of this increased strength is expected to be ability to use a finer but stronger spline for a given application.

Racks are designed and positioned to press deeper and deeper into the parts as they roll together. After full depth is reached, a few additional turns are made at full depth, as required by the application.

A special machine built by Michigan Tool Co. is used to grind the rack teeth to very close tolerances. The machine is designed to give extreme accuracy in tooth spacing, pressure angle, helix angle and other characteristics. Much of the success of the new forming method, it is believed, is due to ability to produce racks to extreme accuracy. Pressure on the hydraulic cylinder is 12,600 lb. Larger and more powerful machines are now being built.

An automatic coolant system is provided for cooling the forming racks and splines under mass production conditions.

Interest of the automobile industry in newly developing, high production cold forming operations is known to be keen. Considerable experimental work on cold rolling of splines has already been carried out by several of the car producers, including the Big Three. The public announcement by Michigan Tool Co. of its new machine is expected to stimulate further the wide interest in the process that is already evident in Detroit.



FORM RACKS of spline roller about to engage shaft outside diameter. This spline has a helical form.



# Only GRAPH-MO® combines these advantages in one tool steel

*Outwears other tool steels 3 to 1*

*Machines 30% faster*

*Is the most stable gage steel ever made*

HERE'S how you can produce gages or dies in less time and make them stay accurate longer. Use Graph-Mo® graphitic tool steel. It's the only steel that gives you the combination of advantages you want most in a tool steel—excellent wearability, excellent machinability and excellent stability.

Free graphite and diamond-hard carbides in the structure of Graph-Mo tool steel give it unusual life. Reports from dozens of users show that Graph-Mo steel outwears other tool steels 3 to 1. And because the graphitic particles act as a "built-in" lubricant, Graph-Mo steel machines 30% faster than other tool steels.

Tests prove that Graph-Mo steel is the most stable gage steel made. For instance, after a 12-year period a



This Graph-Mo tool steel master plug gage showed less than 10 millionths of an inch change during 12-year test period.

typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch change from its original dimensions.

Graph-Mo steel also has minimum tendency to pick up, scuff or gall and gives excellent resistance to abrasion. Tests on Amsler wear machine prove that Graph-Mo steel has twice the resistance to galling when compared with ordinary tool steels.

The difference between Graph-Mo tool steel and other tool steels is so real you can see it—tiny, scattered parallel marks that show the free graphite in its structure.

Insist on this "graphitic look" the next time you buy gages or tool steel. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

**Reduce Spot-Welding Rejects  
With Dice Microhm Meter  
(Model 151-S)**



MIL-W-6850 and MIL-W-6850

This instrument, first developed by Dice, is now widely used in industry to maintain quality control and reduce rejects in the spot-welding of aluminum . . . by checking the surfaces of sheets to see that they have been properly cleaned. The Dice Model 151-S Microhm Meter measures resistances as low as  $\frac{1}{2}$  microhm in the low range to 750,000 microhms (in the highest range). A low resistance reading indicates that the metal to be welded is properly cleaned. The first Model 151 made by Dice is still in perfect working condition after almost five years of constant use. For free bulletin giving detailed information on how the Dice Microhm Meter can help you, write today.

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# FREE

New Bulletins

## Technical Literature

### Paint spraying

Paint spraying equipment for electro-static spraying is described in a new 8-p. bulletin. With the Ionic Gun and Ionic High Potential Paint Spraying equipment, electrically charged particles of paint are attracted to the article to be painted which is made a part of the electrical circuit. Paint is so highly ionized with the Ionic Gun that it produces an even finish and better coverage is obtained using less paint. *Scientific Electric Co.*

For free copy circle No. 1 on postcard, p. 119.

### Equipment

Illustrated booklet offers information and pictures showing the diversity of products, both steam and electric, which are produced by the Elliot Company. Attention is paid to the specialized field of high-capacity centrifugal compressors which led to the manufacture of the turbocharger. Also included is information on the company's line of turbines, condensers, tube cleaners, strainers, ejectors and deaerating heaters. *Elliot Co.*

For free copy circle No. 2 on postcard, p. 119.

### Files

Leaflet describes and illustrates the Heller line of metal finishing files. The undercut or rake of the file teeth enables them to take a real bite and provides faster cutting and longer file life. This feature also allows the file to clear itself readily of chips, particularly on soft, non-ferrous metals. Result is a smooth scratchless finish. *Heller Bros. Co.*

For free copy circle No. 3 on postcard, p. 119.

### Grinding wheels

Pamphlet gives information on sterling resinoid snagging wheels. Three resinoid bonds provide a wide range of casting snagging possibilities to meet each job demand for longer life and faster grinding. For billet grinding many different alloys, Sterling makes available a wide selection of bonds. *Sterling Abrasives Division.*

For free copy circle No. 4 on postcard, p. 119.

### FOR YOUR COPY

**Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 119.**

### Insulating material

Folder tells how to conserve heat with aluminum silicate. Thermal conductivity is extremely low. A loose granular material. Ladle cover weighs only  $7\frac{1}{2}$  lb per cu ft. Its use will not contaminate or injure the material it is used on in any way and it will not pick up moisture in storage. *Ironton Fire Brick Co.*

For free copy circle No. 5 on postcard, p. 119.

### Trimming press

New release gives information on the Brehm trimming press which trims metals, plastics and fibers in a variety of edges. Within certain limitations, it can cut any contour demanded by the product in use: curves, notches, tabs and projections. Operation of the press is controlled by two push-buttons, which can be used to inch down the press. *Steel Products Engineering Co.*

For free copy circle No. 6 on postcard, p. 119.

### Transmissions

New 24-p. catalog outlines the Lovejoy line of power transmission equipment. Design and construction drawings are included. Speed pulleys have durable plastic pulley sheaves, brass shafts which eliminate rust and constant belt alignment. Vari-speed "V" belts are designed to provide greater speed variation and flexibility and to withstand the intense squeezing action of the pulley sheave while transmitting full power capacity. Also included are motor bases, counter-shafts and Select-o-Speed Transmissions. *Lovejoy Flexible Coupling Co.*

For free copy circle No. 7 on postcard, p. 119.

## Spray booths

Standard and heavy-duty models of Roto Wash Spray Booths are fully described with dimensions in a 12-p. bulletin. The spray booth draws air into the washing chamber at both the top and bottom of the water curtain. This creates a more even flow of air at the face of the booth, trapping the maximum amount of paint over-spray in the spraying area. Photos show accessibility of interior surfaces and efficient water action. Bulletin includes complete engineering data. *Newcomb - Detroit Co.*

For free copy circle No. 8 on postcard, p. 119.

## Power brushes

Catalog of power driven brushes contains 16 pages of facts, application and product data for such work as de-burring, roughing, stripping, finishing, polishing, grinding, removing rust, scale and corrosion. Illustrated are models up to 15 in. in diam., miniature sections, end brushes including knot type, solid filled and circular, and many other models for special types of production work. *C. W. Morris Co.*

For free copy circle No. 9 on postcard, p. 119.

## Press brakes

Catalog gives complete specifications on the six series of Metalworker power press brakes for sheet metal and plate. Photographs and text show many of the applications possible with various dies. Complete description of the design and manufacture of these brakes, plus optional features, is included in the catalog. *Airtherm Mfg. Co.*

For free copy circle No. 10 on postcard, p. 119.

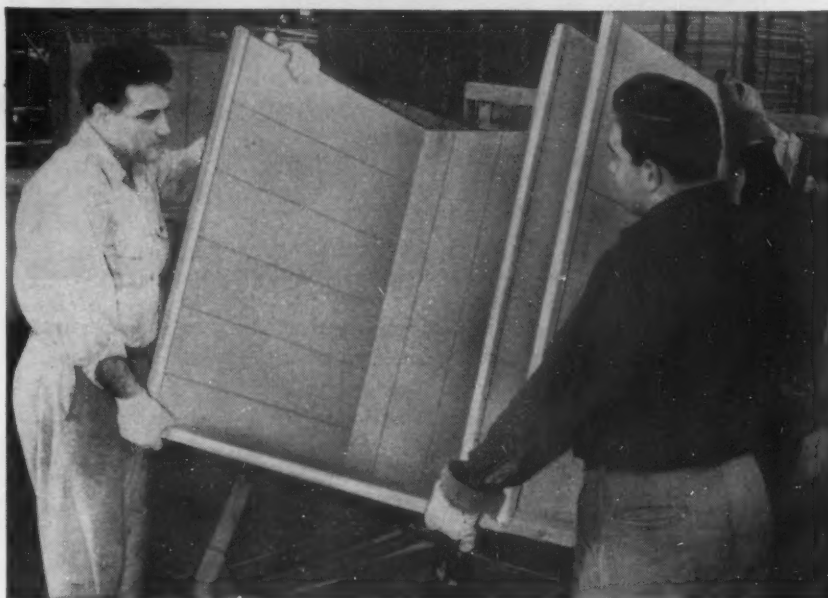
## Steel

Heavily illustrated 66-p. catalog is offered by Bethlehem Steel Co. The catalog describes the properties and features of Mayari\*R high strength low alloy steel, and its use in industrial equipment for the construction industry; in bridges, pipe and penstocks, and in mining, transportation, and marine construction. *Bethlehem Steel Co.*

For free copy circle No. 11 on postcard, p. 119.

Turn Page

# SOLVED with one Generalift Pallet Box



## FOUR separate handling and shipping problems

Here's what happened when Chase Brass and Copper Company of Waterbury, Connecticut, switched to Generalift Pallet Boxes:

### SOLVED: A STORAGE PROBLEM

Generalift Pallet Boxes arrived knocked down, for easy storage—50 took no more storage space than 8 of the former containers.

### SOLVED: A PACKING PROBLEM

Generalift Pallet Boxes assembled, packed and closed—in minutes.

### SOLVED: A HANDLING PROBLEM

Generalift Pallet Boxes were made for easy fork-lift handling.

### SOLVED: A SHIPPING PROBLEM

Generalift Pallet Boxes held more, cost less, and weighed less than the old style container—a 102-lb. Generalift Pallet Box carried 2100 lb. of pay load.

See how Generalift Pallet Boxes can help solve your handling and shipping problems—at a saving. Write for full details.

Engineered Containers for every shipping need

Factories: Cincinnati; Denville, N. J.; East St. Louis; Detroit; Kansas City; Louisville; Milwaukee; Prescott, Ark.; Sheboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston.

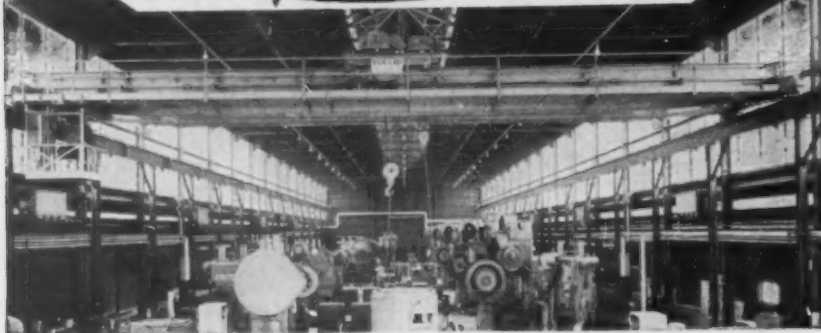
# General Box

GENERAL BOX COMPANY, 1873 MINER STREET, DES PLAINES, ILL.





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**T**HIS wide span, three motor, cab-controlled crane embodies exactly the features that are needed for assembly floor operations. Rapid speed of travel laterally and longitudinally—hoists of two capacities for lifting—ease of operation including precision magnetic control which is so essential in assembling vital components of valuable machines. And, of course, characteristic Euclid low operation and upkeep costs which have established an unexcelled record for repeat orders from discriminating purchasers.

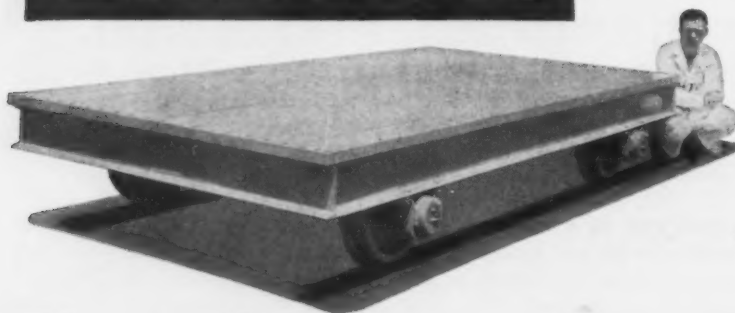


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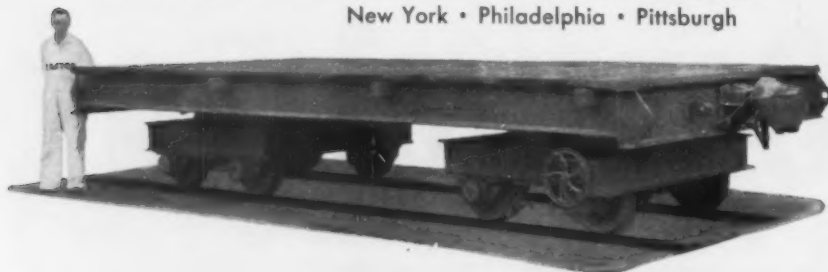


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## Free Technical Literature

*Continued*

### Boosters

Booklet tells how to avoid fire hazards with Sciaky Water Hydro-Pneumatic boosters. Booster operates with water, saving the cost of expensive oils or noninflammable liquids. In addition to reducing fire hazard, Sciaky boosters also eliminate messy or dangerously slippery work areas. Normal plant water line or welder cooling line provides sufficient supply for these units. **Sciaky Bros., Inc.**

For free copy circle No. 12 on postcard, p. 119.

### Cranes

Heavy-duty Lorain Moto-Cranes and Self-Propelled cranes are featured in a 20-p. catalog. Detailed design and construction views are highlighted with photographs. Operating gains are discussed in a section on the Hydraulic Coupling Take-Off. Loads may be raised and lowered by throttle control to obtain smoother hoisting, precision lowering all at variable speeds. Anti-friction bearings are used in the hoist and swing drums. **The Shovel Co.**

For free copy circle No. 13 on postcard, p. 119.

### Stress calculator

Data compiled and used by Roebling's wire rope engineers is incorporated and condensed into a handy slide rule available from the company without charge. The calculator is designed to tell at a glance the safe and economical size of wire rope for every load for all types of crane, derrick and overhead traveling crane installations. **John A. Roebling's Sons Corp.**

For free copy circle No. 14 on postcard, p. 119.

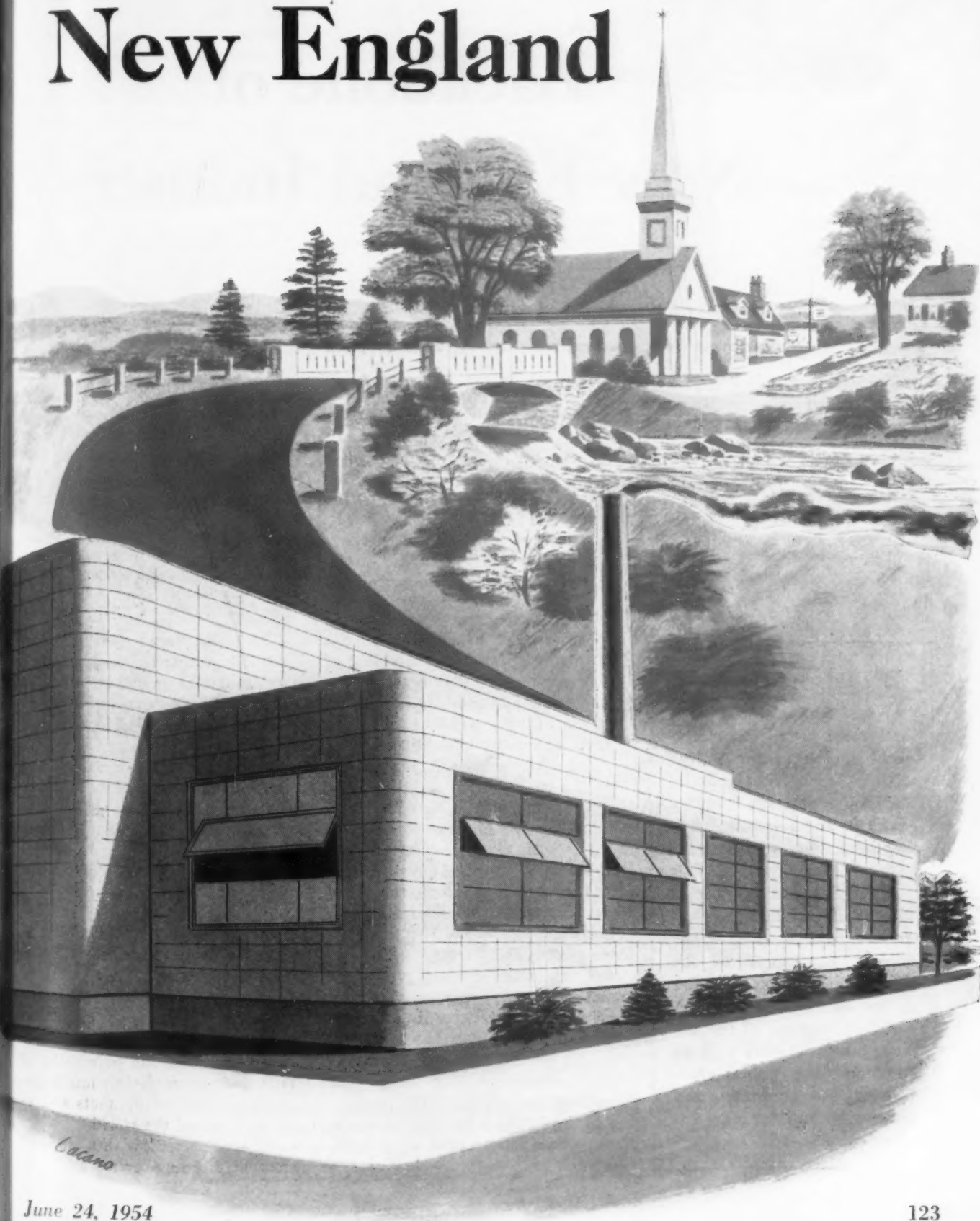
### Weld tester

Brochure contains information on Michrom Meters used to measure surface resistance of metals prior to welding. The instrument checks the cleanliness of aluminum or other sheet metals. Low surface resistance shows material is clean and should weld properly. Instrument also measures resistance of coupons in a test jig. It can also be used for trouble shooting on welding equipment. **J. W. Dice Co.**

For free copy circle No. 15 on postcard, p. 119.

Turn Page

# Salute to New England



June 24, 1954



# Metalworking: Backbone of New England Industry

**"If the country as a whole produced as much income per square mile as N. E., national income would be raised . . . to three times current level." And N. E.'s metalmen are now the top dogs in the region's economy. Expansion is from within.**



**Walter Raleigh**  
Executive Vice-President  
New England Council . . .

**COVERS N. E. industry like a blanket. He spends more time visiting business and industrial leaders than he does in his office.**

## Why This Special Study

**New England, the first and most highly industrialized region in the United States, is undergoing an industrial transition. Employment in some industries is declining; in others it is rising.**

**New England is neither lagging disastrously, as her critics charge; nor is she forging far ahead of the rest of the country, as some of her boosters claim.**

**Other sections of the nation may ultimately face some of the same challenges; the problems and lessons are not for New England alone—Ed.**

The Yankee has always been a man of mettle, an individual of courage, resourcefulness and enterprise. But these days—with an apology for the pun—he prefers to spell the word m-e-t-a-l. And as usual, there's logic in his preference.

The simple fact is, New England's metalmen are now the top dogs in the New England economy.

Working in all known metals and a myriad of alloys, they turn out a range of products which has properly been called "fantastic"—teaspoons and turbines, cameras, computers and common pins, guns and butter knives, bottlecaps and battlewagons, jet engines and wedding rings.

And behind all these, New England makes machine tools—the basis of modern industrial production, and "the only inanimate objects capable of reproducing themselves."

In 1948, "there were probably not 10 countries in the world whose annual income equaled New England's," reported the President's Council of Economic Advisers.

"If the country as a whole," they continued, "produced as much income per square mile as New England in 1948, the national income would be raised to . . . about three times the current income of the country."

Income payments to New Englanders totalled \$16.6 billion in 1952, the latest year available. The 1946 figure was \$11.8 billion, and that for 1940 was \$6.1 billion.

For generations, the prime source of new money for New England has been the processing of imported raw materials into an incredible array of products sold to the nation and the world.

What keeps New England an eminently going concern is its



24,000 manufacturing plants — up 50 pct in number since 1939—its million and a half industrial workers, and its \$4 billion manufacturing payroll.

With 2 pct of the country's area and 6 pct of its population, New England has nearly 10 pct of its manufacturing employment. It has 16 pct of the country's machine tools "in place." And in 1952, it accounted for 25 pct of the country's machine tool shipments.

In this vast complex of manufacturing activities, New England's metalmen are dominant—employing nearly 44 pct of the region's total manufacturing workforce.

At the end of the first quarter of 1954, their combined employment stood at 640,300—about three and one-half times the employment figure of New England's textile industries, for generations the area's economic mainstay.

And in 1954, for the first time in a century, a single segment of New England metalworking toppled textiles from its position as the region's largest single employer. Still caught in the wringer of a national slump, textile manufacturing sagged this spring below the 182,000 workroll of Yankee makers of non-electrical machinery.

Today's New England metalmen

can point to these achievements within recent months:

- Launched the world's first atomic-powered submarine.
- Sent down the ways the world's largest tanker.
- Put into production the country's most powerful jet engine.
- Devised a successful method of casting titanium.
- Began limited mass production of the most powerful hand gun yet made.
- Developed a silicon transistor to withstand heats which disable those made of germanium.
- Delivered for cancer research a 50 million volt linear accelerator which fires electrons at almost the speed of light.
- Design of a small, powerful gas turbine motor for helicopters.
- Shipped out the world's fastest electronic computer.
- Began production of a plane which takes off in 75 yards at under 40 mph, cruises at 155.
- Installation of a 13-story 50,000 ton hydraulic forging press—the world's biggest.

Between 1939 and 1953, New England manufacturing employment increased by 34 pct and most of this healthy growth occurred in

## New England Produces:

62%	of Silverware	
57%	of Textile Machinery	
49%	of Nails and Spikes	
45%	of Cutlery	
45%	of Typewriters	
42%	of Handsaws and Blades	
37%	of Pins, Needles, Fasteners	
37%	of Ball and Roller Bearings	
37%	of Jewelry	
34%	of Copper Rolling and Drawing	
30%	of Abrasive Products	
30%	of Insulated Wire and Cable	
27%	of Machine Tools	

Source: Fed. Res. Bank, Boston

the metal-using industries. Of the more than 400,000 jobs added during that period, three-quarters were in metalworking. And of

## New England's Metalworking Tally Sheet

	Number of Plants		Number of Workers			Production Wages (000's)		Value Added (000's)		
	1939	1947†	1939	1947	Mar. 1954†	1947	1952†	1939	1947	1952†
Primary Metals .....	341	579	45,000	70,100	56,400	\$149,920	211,074	\$134,073	\$288,198	\$506,022
Fabricated Metals .....	1,076	1,723	70,300	106,600	106,500	237,274	280,349	158,378	506,176	660,306
Machinery (Except Elec.) .....	916	1,851	105,500	198,900	182,000	462,436	657,271	287,792	933,120	1,519,942
Electrical Machinery .....	188	367	46,000	108,000	129,800	182,300	299,826	125,396	451,266	831,337
Transportation .....	148	285	25,700	55,000	101,900	109,534	262,027	70,366	206,974	548,679
Instruments .....	143	253	24,200	40,800	43,800	76,360	91,630	51,364	165,832	227,797
	2,812	5,058	316,700	579,400	620,400*	\$1,217,824	\$1,802,177	\$827,369	\$2,551,566	\$4,294,083

† Latest available.

\* Does not include 19,900 New England workers classified as "Ordnance" by BLS in a series begun in 1951.

Source: Bureau of the Census, excepting "Number of Workers" for 1947 and 1954, which are Bureau of Labor Statistics. The 1939 Bureau of Census figures for "Number of Workers" have been adjusted for comparability.

87,000 new manufacturing workers added to the region's rolls from 1947 to 1953, some 73 pct were metalworkers, and 65 pct were in the two branches, electrical machinery (including electronics), and transportation equipment, principally aircraft.

New England's metalworking score card is shown on the preceding page.

Although there's been no census of plants since 1947, N. E.'s total is estimated at 7800, a gain of 500 plants in 15 years.

In March, 1954, N. E. durable goods employment stood at 91.9 pct of March, '53, somewhat better than the country as a whole, which was 90.4 pct.

But the bare bones of statistics convey no impression of the liveliness, the excitement, that pervades many of New England's metal-using industries. They hide the arduous research and development work carried on in hundreds of industrial laboratories, the pilot operations, the launching of entirely new and sometimes almost inconceivable products.

And they hide, too, significant figures on that giant stripling, electronics. His dimensions are imbedded in the overall classification "electrical machinery," and available statistics don't fully reveal his location, size and rate of growth. He won't stand still long enough to get measured.

But even so, special studies show that New England's participation in the burgeoning electronics industry is high. Two years ago *Electronics* magazine reported that 14.4 pct of the nation's manufacturers in this field were in New England—a total of 466 firms. This latter figure exceeds by 99 the total of *all* the region's establishments in the *entire* electrical machinery category reported in the census of 1947. And we know that dozens of new electronics firms have begun operations in New England within the past 2 years.

In a recent study of 149 electronics manufacturers largely in the Greater Boston area, the Federal Reserve Bank found that one-third of these had less than 50 employees, and that nearly half of the 149 had begun operations since World War II. But two-thirds of those surveyed planned expansion in the early future, and 77 of them gave specific data. If their plans materialized, these 77 would invest \$23 million, expand plant space by over two million sq ft, and provide about 7800 new jobs.

## **They've Been Doing It For Years**

**There's nothing new about metalworking in New England except its spectacular growth in recent years.**

**By the time the Pilgrims were celebrating their first Thanksgiving they were beating out nails and spikes and marine hardware.**

And Boston was only 15 years old when the first iron works was built in nearby Saugus. Output of four or five tons per week was turned into pots and skillets, bar iron which neighboring blacksmiths worked into useful forms, and rods from which nails were made. This beginning of the world's greatest steel industry is being rebuilt at a cost well over \$1 million.

If further proof of the antiquity of New England metalworking is needed, consider these names and the years in which they began operations: Scovill, 1802; Seth Thomas, 1813; Draper, 1816; Builders Iron Foundry, 1821; Saco Lowell, 1824; Fairbanks Morse, 1824; Jones and Lamson, 1830; American Screw, 1831; Whitin Machine, 1831; Colt, 1836; American Hardware, 1839; Landers, Frary and Clark, 1842; Stanley Works, 1843; Waltham Watch, 1849; Bristol Brass, 1850; Smith and Wesson, 1852.

These centenarians are not only still alive but kicking vigorously, as their competitors will grimly tell you. And there are dozens of others in New England with equally remarkable records of virility.

Space prohibits even the barest listing of the enormous contributions of the Yankees to metalworking. But it is important to record once again that it was gunmaker Eli Whitney of New Haven who, more than 150 years ago, perfected the principle of interchangeable parts and developed the system of specialized labor which made possible the whole technique of the assembly line and mass production as we know it today.

### **Growth Comes From Within**

A carefully selected sample of more than 2000 manufacturing companies which began operations in New England in 1947-1948 showed that about 85 pct were created in a similar fashion—from within the region.

And of 63 new manufacturing firms established in Connecticut in the last 3 months of 1953—of which 36 were metal-users—only 8 came from outside the state. The rest were born there—sired by imagination, damed by available risk capital.

This surging record of New England's metalworking industries is all the more remarkable in that most of the materials used in their multi-billion dollar annual production is imported. The fact that New Englanders, with scant natural resources, can compete successfully with plants closer to materials sources is a tribute to their traditional ingenuity, their precision workmanship, and their overall industriousness.

A penetrating analysis by The Committee  
of New England shows that the region's . . .

# Research Facilities Top The Nation

*But manufacturers are not yet taking  
full advantage of available research  
facilities outside their own companies.  
And their own research should be raised  
to improve their competitive position.*

THE steady rise of research and development is of enormous importance to New England. Its citizens share the interest of all persons in the fruits of technical progress, but their dependence on research is even more immediate.

Manufacturing is vital to New England's economic life, since it provides income directly or indirectly for two-thirds of the region's people.

This first and most highly industrialized region of the nation has its handicaps as well as its advantages.

Some of its largest industries are old industries with old plants, equipment and methods. The region is not rich in mineral resources. And remote location means high freight costs to bring raw materials in and move manufactured products out. Fuel and power costs also reflect transportation costs.

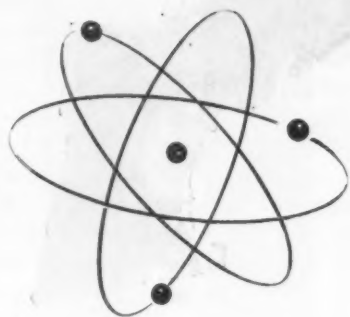
Faced with these cost disadvantages, many New England manu-

facturers have found they can prosper by turning out unique or superior products. N.E. firms outstripping their competitors attribute their success largely to better products or better sales techniques. N.E. firms lagging their competitors generally blame higher costs.

## What Research Can Do

"Advances in science when put to practical use mean more jobs, higher wages, shorter hours, more abundant crops, more leisure for recreation, for study, for learning how to live without the deadening drudgery which has been the burden of the common man for ages past.

"Advances in science will also bring higher standards of living, will lead to the prevention or cure of diseases, will promote conservation of our limited natural resources, and will assure means of defense against aggression."—Vannevar Bush.



As competition from other regions has increased, more and more NE manufacturers have adapted their products to changing conditions and have turned to opportunities in "newer" fields.

Research has played a key role in: (1) Helping make necessary adjustments in industrial structure, and (2) providing a source of dynamic expansion to keep pace with population growth.

## Industrial Research Spotty

Transition and growth in N.E. are far from finished. They must continue. New England's manufacturers can no longer survive by making standard products and selling them in standard fashion. They have moved far toward development of unique and specialized products. But they must still go farther.

This is the challenge to management. What research resources are available to help meet it? And how well are they being used?

Each of the following major types of research facilities presents its own special opportunities for technical progress:

Studies of the National Research Council show N.E. above the national average in number of industrial research laboratories. But N.E. labs are smaller in size.

Of 2820 industrial research labs



in the United States in 1950, N.E. accounted for 311, or 11 pct. This compares favorably with N.E.'s 10 pct of total manufacturing employment.

New England labs employed 5433 professional workers and 8973 supporting personnel, a total of 14,000. These figures represented 8 pct of the nation's professional workers, 10 pct of supporting personnel, and 9 pct of total personnel.

It is evident that there is much more research activity in some industries than in others. The chemical industry, for example, employs only 2 pct of manufacturing workers but accounts for 22 pct of professional researchers in the area (see table on next page).

#### **Some Industries Lagging**

Aircraft, machinery, and electrical equipment industries account for another 40 pct or more. But such important N.E. manufacturing industries as food products, apparel, lumber and wood products, furniture, and leather and leather products employ only 5 pct of researchers though they employ more than 40 pct of manufacturing workers.

Manufacturers in those industries whose shares of research ef-

forts are less than their shares of manufacturing employment should carefully consider expansion of their technical activities.

Northern N.E. states, which are in need of more industrial development and diversification, should work strenuously to attract and develop new technically oriented manufacturing firms.

#### **Trade Assn. Research Low**

New England firms hold a relatively small portion of government research and development contracts. They might improve their long-run positions by aggressively seeking such contracts—even if the short-term profit from them is not great.

According to National Research Council, there were 31 trade association laboratories in the U. S. in 1950. None of them are located in New England. This is believed due to more central geographic location of trade associations' headquarters.

Nevertheless, it would appear desirable for New England manufacturers to undertake joint sponsorship of research within their industries.

There are several large endowed, nonprofit research institutions and 100 or more smaller ones

within the country as a whole.

Lowell Textile Institute Research Foundation is a relatively new and promising research arm serving N.E. manufacturers as well as those outside the region. Research needs of N.E. textile and allied manufactures are so great they should make fullest possible use of Lowell Institute.

In addition, there seems to be opportunity for additional nonprofit research foundations, even on a regional basis.

#### **Commercial Laboratories Good**

Of 462 independent consulting laboratories in the U. S. in 1950, some 40, or 8.6 pct, were in N.E. But in terms of professional personnel, NE employed 12.7 of the national total.

New England is well provided in number and variety of consulting labs. But manufacturers might profitably give more serious thought to supplementing their own research with greater use of experienced technical consulting firms.

#### **College Labs Outstanding**

New England universities and colleges are outstanding in their training of scientists. A Bureau of Labor Statistics survey of 41,000

## **How to Improve Industrial Research In New England**

▶ Manufacturers might well provide mutual support of fundamental research that would benefit all members of their industry. Joint research can provide broad benefits, often more cheaply than can be achieved through individual action.

▶ Manufacturers should make greater use of specialized nonprofit research organizations both in and out of N.E. Development of regional research laboratories should be encouraged as in other regions.

▶ Commercial consulting laboratories should be employed more extensively and efficiently—especially by smaller companies not having adequate technical facilities of their own.

▶ More use should be made of college and university technical facilities, especially those provided expressly

to furnish services to private businesses and government. This need is especially great in the northern NE states.

▶ The regional and state business and development organizations should maintain and intensify their efforts to increase research-consciousness of manufacturers.

▶ Manufacturers should participate more actively in research and development programs of the Federal Government to acquire new knowledge applicable to their civilian business, as well as to contribute to national security.

▶ Manufacturers should take greater advantage of the technically trained graduates of N.E. colleges and universities, an important domestic resource.

scientists in 1948 showed almost 14 pct of their Ph.D. degrees and 12.5 pct of their bachelor degrees were awarded in the region. Compared with N.E.'s 6.3 pct of the population, these are impressive proportions.

Yet only 8.1 pct of the 41,000 scientists were employed in N.E. This still topped the national average but was exceeded by one region and several individual states.

In a survey of colleges and universities all answering said there was a net outflow of their technically trained graduates from the area.

More technical graduates wanted to remain in N.E. but found job opportunities in other areas more numerous and attractive.

New England industry is not yet taking full advantage of the rich resources of technical manpower available within the region. It could also make more use of its institutional laboratories.

#### Government Labs Lag

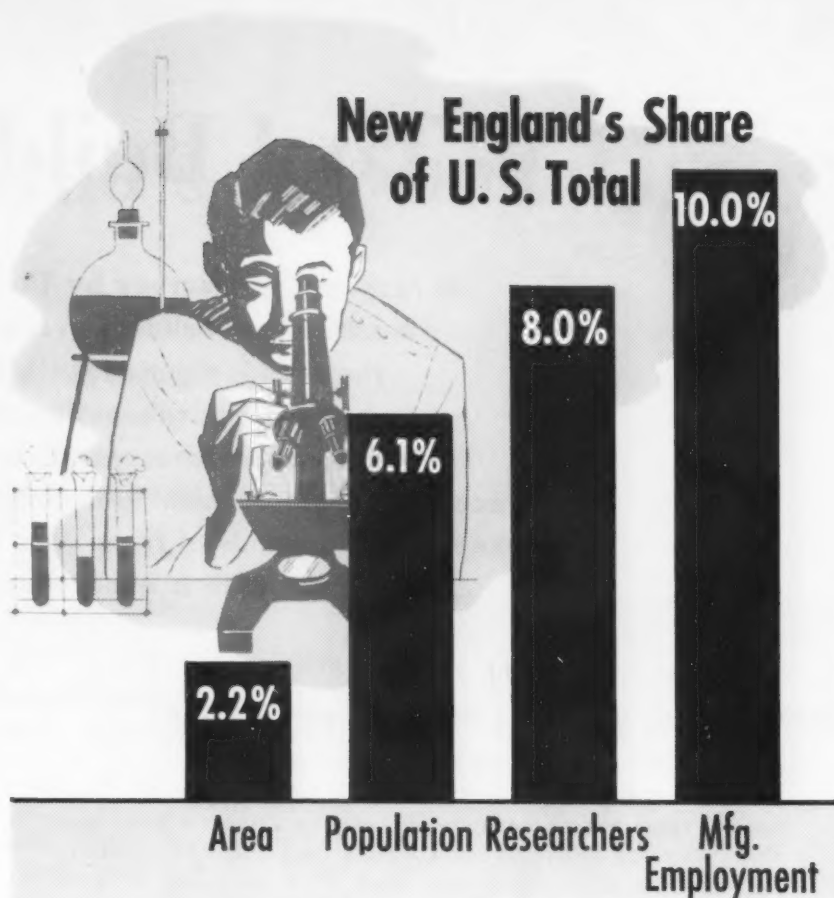
Despite the Federal Government's extensive use of N.E.'s educational research facilities, it has located very few of its own laboratories in the region.

Regional development agencies should encourage construction of government laboratories when a location in N.E. has the desired characteristics.

New England is as active in its total technical effort as the nation as a whole. Scientific leadership of its colleges and universities is particularly outstanding. But manufacturers are not yet taking full advantage of available research facilities outside their own companies. And they are still far short of the full potentialities of their own development.

The extent of any company's research and development activities depends upon the attitudes and decisions of its management.

This is a very important, though specialized, aspect of industrial management. In deciding about the extent of research management must realize it is considering a long term investment. A quick payout from research should be considered a windfall, rather than an expected result.



#### N.E. Manufacturing & Research Employment

Industry Group	Pct of New England Total		Pct of U. S. Total	
	Manu-facturing	Research†	Manu-facturing	Research†
All manufacturing.....	100	100	10	8
Ordinance.....	1	1	53	5
Food products.....	5	1	4	2
Tobacco products.....	*	0	1	0
Textiles.....	19	4	21	24
Apparel.....	6		7	
Lumber and wood products.....	3	*	5	2
Furniture.....	1	*	6	9
Paper products.....	5	5	14	17
Printing and publishing.....	4	1	8	55
Chemicals.....	2	22	4	7
Petroleum and coal products.....	*	*	2	*
Rubber products.....	3	5	17	12
Leather and leather products.....	8	1	29	37
Stone, clay and glass products.....	1	2	4	8
Primary metal products.....	4	3	5	6
Fabricated metal products.....	7	2	11	7
Machinery (except electrical).....	11	14	12	17
Electrical equipment (including communication equipment).....	7	14	13	5
Transportation equipment.....	4	17	4	12
Instruments.....	2	7	14	11
Miscellaneous manufacturing.....	7	2	12	20

\* Less than 0.5 pct.

† Research employment includes only professional researchers.

Source: National Research Council; U. S. Bureau of Labor Statistics, 1950.

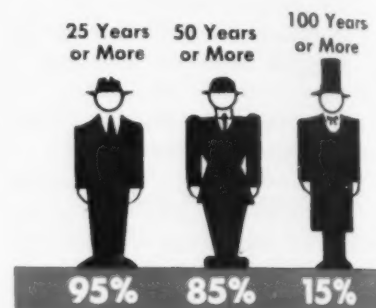


# Tool Builders Say ...

In response to a survey by The Iron Age, New England machine tool builders overwhelmingly testified that the area is a good location for their plants. There was not a single dissenting vote among the replies. The survey was addressed to the chief executive officer of each of the 37 machine tool companies in New England. Replies were received from 19, a 51 pct return, and they indicate a good penetration of the industry.

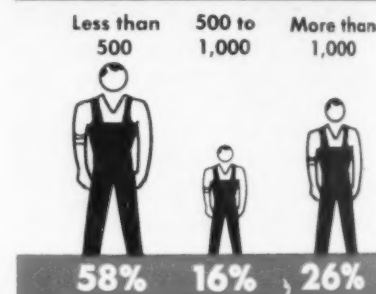
## How long has your firm been in New England?

All but one of the 19 machine tool companies answering this question have been located in N. E. 25 years or longer. Fourteen of them have been there 50 years or longer; 5 have been there 75 years or longer; and 3 have been there 100 years or longer. The older firms also rank high in terms of total employment. Youngest company has been in N. E. 20 years.



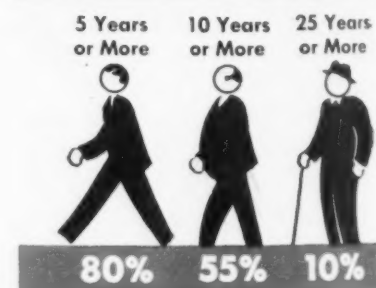
## What is your total employment?

Three of the five firms employing more than 1000 persons have been in business in N. E. more than 100 years. Three firms employ between 500 and 1000 people, and 11 firms employ fewer than 500. Three firms employ fewer than 100 people. Several officials gave us an employment range, in which cases we used the midpoint. Top employment reported is 4000.



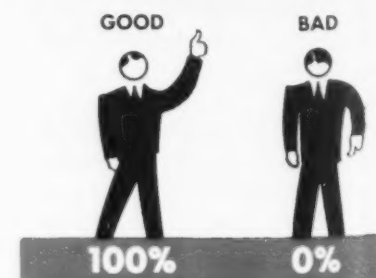
## How long have your employees been with you?

Some officials gave us numbers of employees and some gave us percentages of employees in the 5-years-or-more, 10-years-or-more, and 25-years-or-more categories. We converted all percentages into actual numbers of employees, totalled the categories, and divided by total employment to find the portion of total in each group. Result: amazing labor stability.



## Do you think N. E. is a good or bad location for a machine tool builder? Why?

Comments: "Ample supply of highly skilled labor and technicians . . . Easy to attract alert engineering and executive talent . . . Transportation, easy access to ports for foreign shipment . . . Good research and educational facilities . . . Labor more stable . . . Better attitude by labor . . . Diversified industries in area . . . Good climate, recreational facilities."





# New England's a Good Home

## Do you consider nearness to research facilities, especially electronics, an advantage? In what way?

Comments: "For the further development of automatic controls on machine tools . . . Research is playing an increasingly important part in machine tool development . . . Awareness of recent research developments . . . Close relations with vendors of control mechanisms . . . Personal contacts of our researchers with electronics . . . Helps on special machinery."

## How do you overcome the freight advantage of firms located nearer large Midwest tool using areas?

Answers to this one are better than the question. Answers had to be written in, and it is surprising that just two answers cover all but two replies. Comment: "Tools are sold on performance, not price . . . Freight costs small part . . . Better engineering and products . . . Labor is much bigger factor than freight . . . Our machines are easily worth the extra."

## Have you recently achieved any new tool developments you would care to mention?

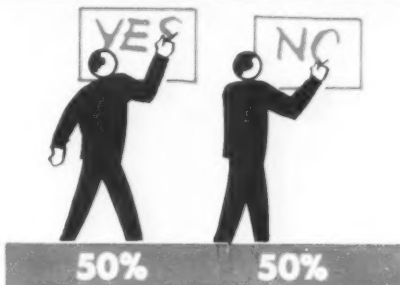
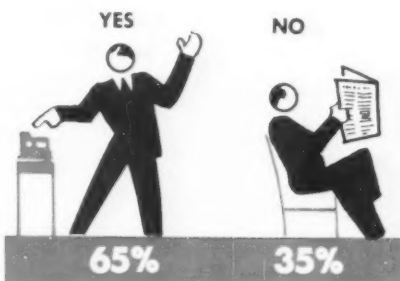
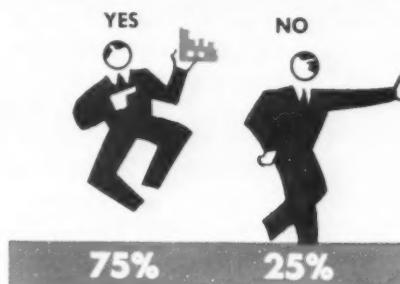
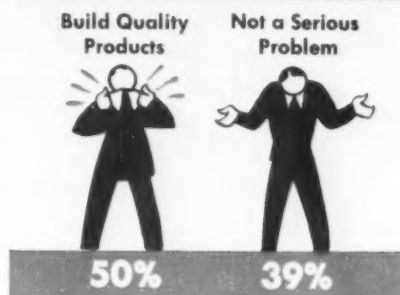
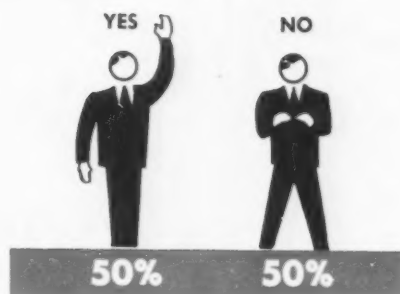
Comments: "New application of all-electronic contouring unit with vertical milling machines . . . New single spindle automatic screw machine permits both ends of work to be machined . . . Electro mechanical drive on broaching machine instead of hydraulic . . . Thread rolling attachment for screw machines . . . New permanent magnet chucks."

## Have you diversified your business by manufacturing something other than machine tools? What?

Comments: "Contract manufacturing and engineering work . . . Paper box folding machinery and electronic counting devices (post) . . . Subcontract work is half our business . . . Air and hydraulic valves, cylinders . . . Plastic injection molding machines . . . Zinc diecasting machines . . . Machinists tools, pumps, Auto service equipment . . . Gage blocks, vices."

## Are you contemplating any future product diversification?

Most who have already diversified production to some extent are planning to increase diversification along lines already charted . . . Several who plan to diversify, have not decided what to make . . . One has a New Products Research and Development Dept. whose job it is to seek, design, and develop new products . . . Another will make diecasting equipment.





# Labor: New England's Precious Resource

Job changes in New England reflect an industrial transition. Manufacturing jobs are shifting from textiles to metalworking. A still bigger gain in manufacturing is needed.

New England's battle for jobs may be divided into two parts. The soft goods part is a holding fight to keep what she has. The hard goods part is an all-out attack to provide dynamic expansion.

Both actions are part of a great industrial transition that has been going on for a number of years and will probably continue for many more.

Changes in the region's manufacturing employment have been dominated by contractions in soft goods, largely textiles, and more than offsetting expansion in metalworking (hard goods). This

is especially true since 1947.

The employment transition has been speeded since 1950 by the defense program. Of course this has been most evident in companies obtaining military contracts. But it has also been reflected in more expansion of industrial plant and equipment. And it has stimulated research which has led to establishment and growth of some new manufacturing activities.

## Needs Manufacturing Jobs

As in other regions of the nation, guns plus butter has equalled prosperity. This has helped community and state development groups in their efforts to increase and diversify employment.

While employment increases in metalworking have more than offset the rapid decline in textiles, manufacturing as a whole has accounted for only a small part of the gain in nonfarm employment, as indicated by the accompanying table.

Increases in the portion of workers employed in government,



William V. Packard  
News-Markets Editor . . .

KNOWS ABOUT N. E. labor first hand. He worked in a metalworking plant for 2 years. And he visits N. E. often, covering labor, management, and metalworking subjects.

## PEOPLE COUNT MOST

The most precious resource of New England is its people. Early settlers of the region had to be of sturdy stock to remain undaunted by the rock-bound coast and a climate that must have seemed harsh.

They rapidly established industrial supremacy in the new country, based on commerce and manufacturing. Their Yankee Clippers became famous around the world. And the waters of the many streams were harnessed to furnish power to run the factories.

The region is not rich in natural resources, but its opportunistic people have overcome this disadvantage. Yankee ingenuity is more than a byword; it aptly describes a key to the region's continuing progress.

The skills of generations have built a reputation for quality goods. And the skillful, well educated, stable workforce is today the area's strongest lure for industry.

## Changes in Nonfarm Jobs (Monthly Averages in Thousands)

	1947	1953	Pct Change
Total Nonfarm Jobs	3296.3	3545.2	+ 7.6
Manufacturing	1528.2	1575.4	+ 3.1
Nonmanufacturing	1768.1	1969.5	+11.4
Trade	612.9	666.1	+ 8.7
Government	336.5	408.3	+21.3
Service	339.2	381.0	+12.3
Transportation	224.8	217.2	- 3.3
Finance	126.5	150.2	+18.9
Construction	126.2	146.7	+16.3

Source: U. S. Bureau of Labor Statistics.

service, and trade are to be expected. But, because of New England's heavy dependence on manufacturing, a good rate of expansion of manufacturing should be maintained in order to keep the economy healthy.

The quality of the New England workforce is excellent. In response to a survey by THE IRON AGE, machine tool companies in the region most often put skill and stability of labor at the top of their list of reasons why they liked their New England location.

### Machinery Tops Textiles

Average monthly employment last year in N.E. manufacturing industries is shown at the right. Latest figures (March 1954) show that nonelectrical machinery has jumped ahead of textiles as the leading N.E. industry in manufacturing employment.

The shift in manufacturing employment from nondurable to durable goods takes on more significance when viewed in terms of value added by manufacture.

A recent study by The Federal Reserve Bank of Boston shows that in 1939 makers of durable goods contributed only 39 pct of the total value added by manufacture in New England. In 1947 they produced 42 pct and in 1952 they increased their importance to 52 pct of the total. Between 1947 and 1952 durable goods makers accounted for 85 pct of the increase in value added by manufacture. And nearly all of this occurred in metalworking industries.

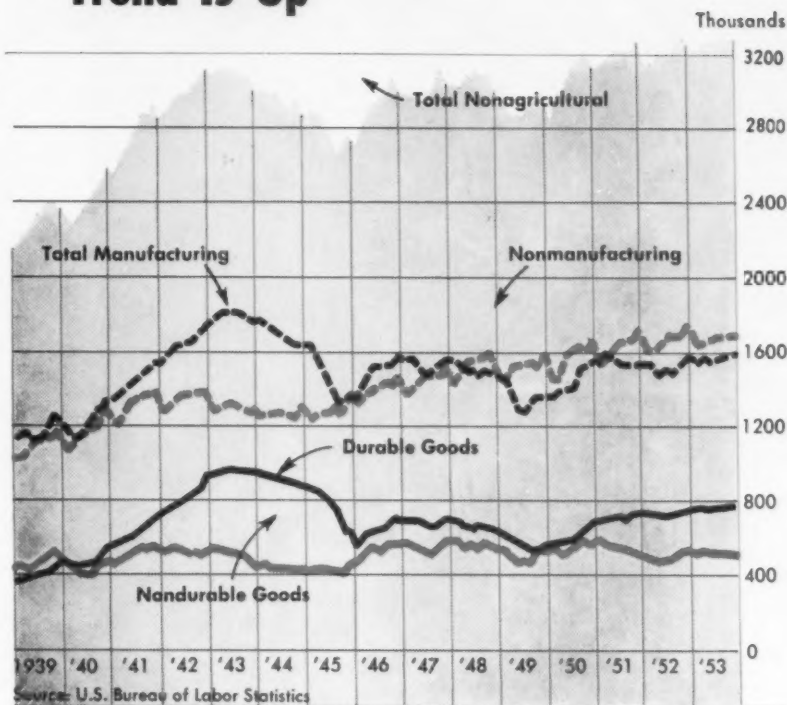
### Metalworking Adds Most

In terms of increase in value added per man hour the biggest gains were again scored by metalworking industries, which copped the top six places.

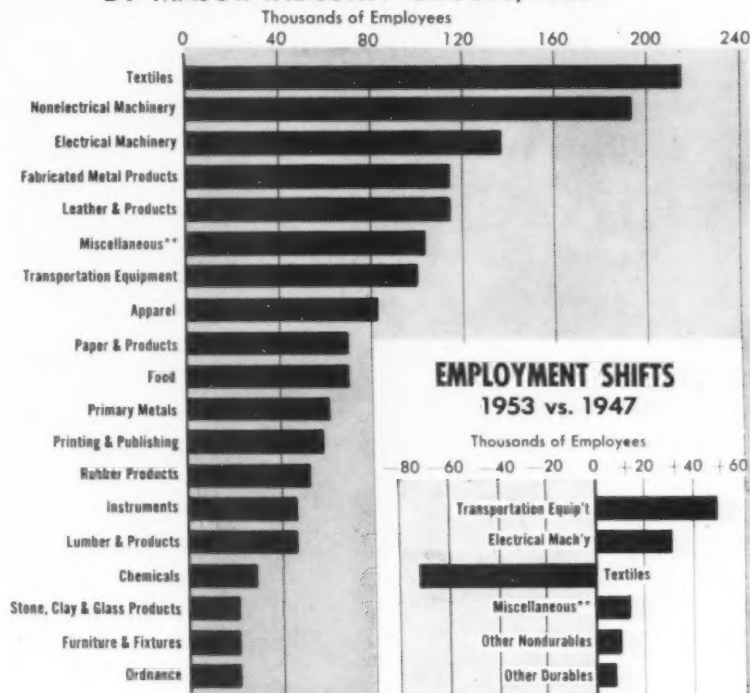
It is apparent that the region is making more effective use of its labor force. The high-value-added industries generally call for a high level of skills and pay higher wages.

But, despite the appeal of hard goods jobs, they are inclined to be less stable. That's why it is important not to neglect soft goods manufacture while striving to boost employment in the hard goods industries.

## New England Employment Trend Is Up



## New England Manufacturing Employment BY MAJOR INDUSTRY GROUPS, 1953\*



\* Monthly Average \*\* Includes tobacco, petroleum and coal products, jewelry, and silverware  
Sources: U.S. Bureau of Labor Statistics; Fed. Reserve Bank, Boston





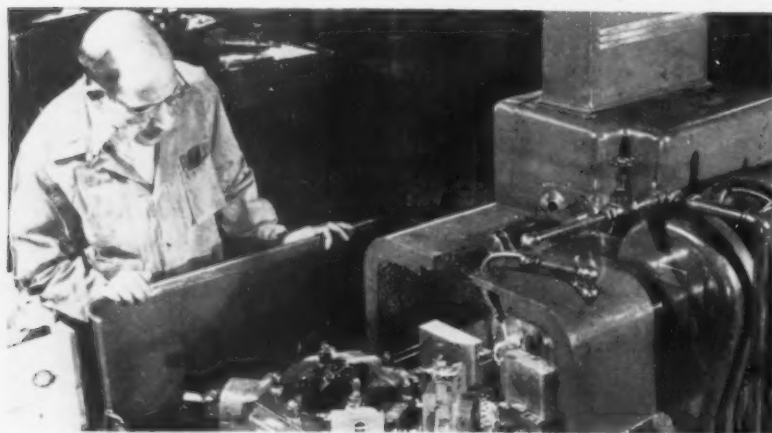
**SMOOTH** finishes are essential for high velocity air flow. So the compressor of this Pratt & Whitney Turbo Wasp is buffed into a high polish. Compressor crams air into combustion chambers.



**RESEARCH** chemists and engineers at Enthone, Inc., New Haven, specialize in metal finishing problems.

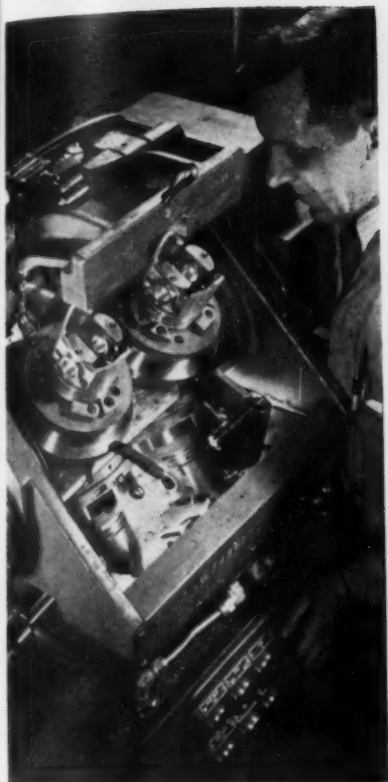
## N. E. Products in Action

Here are just a few of the companies and products that are maintaining New England's reputation for quality. During the past few years metalworking has expanded faster than the other manufacturing industries.

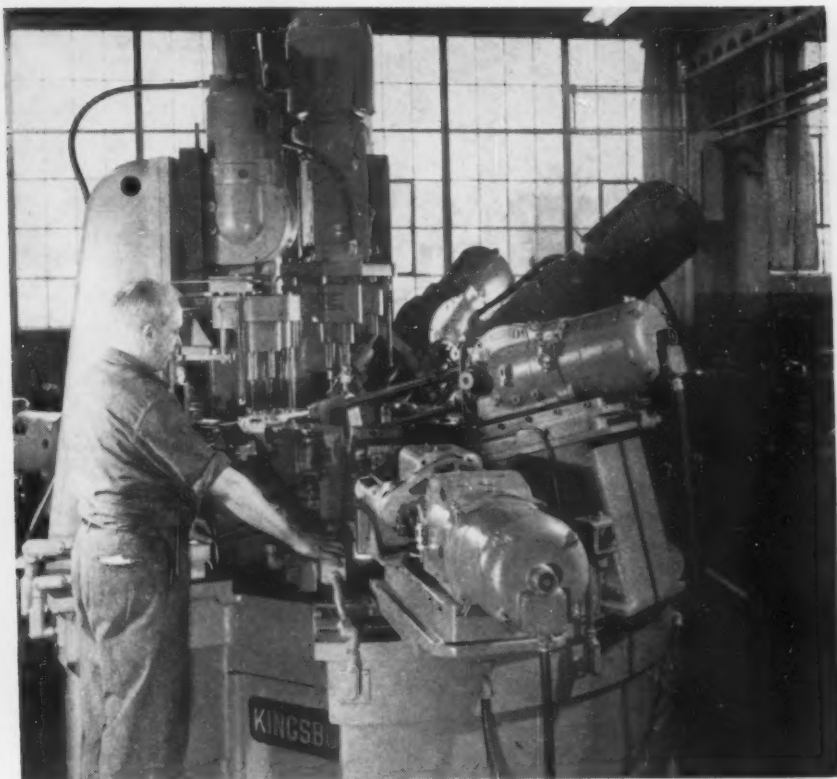


**METALS** yield secrets to Baird Associates instruments in spectrographic lab of Richard's Corp., Boston.

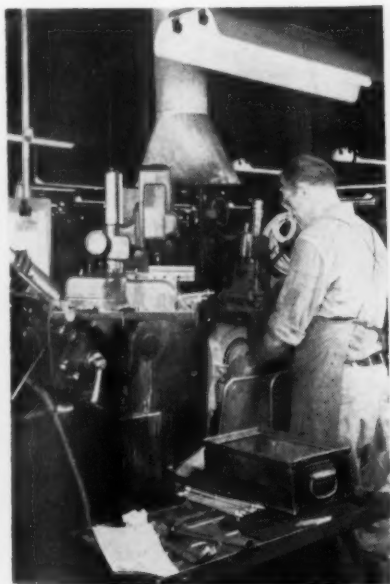
**AUTOMATIC** turret lathes like this one are made by Potter & Johnson Co. in Pawtucket, Rhode Island.



PISTONS get elliptical turning, boring of wrist pin holes and grooving on this Heald Bore-Matic machine.



Special automatic drilling machine is getting its final test run at Kingsbury Machine Tool Corp., Keene, N. H., prior to delivery to an auto maker. Machines are also used in aircraft, appliance plants.



PRODUCTION and precision are obtained at Hartford Machine Screw on standard, special products.

CHECKING close tolerances of parts is simplified by using Brown and Sharpe electrical gages.



## N. E. products in action

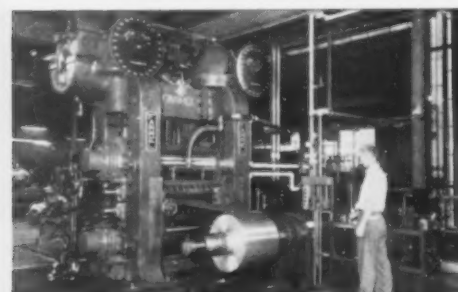
*continued*



SPRINGFIELD, Mass., is noted for quality machine tools. These are Van Norman centerless grinders.



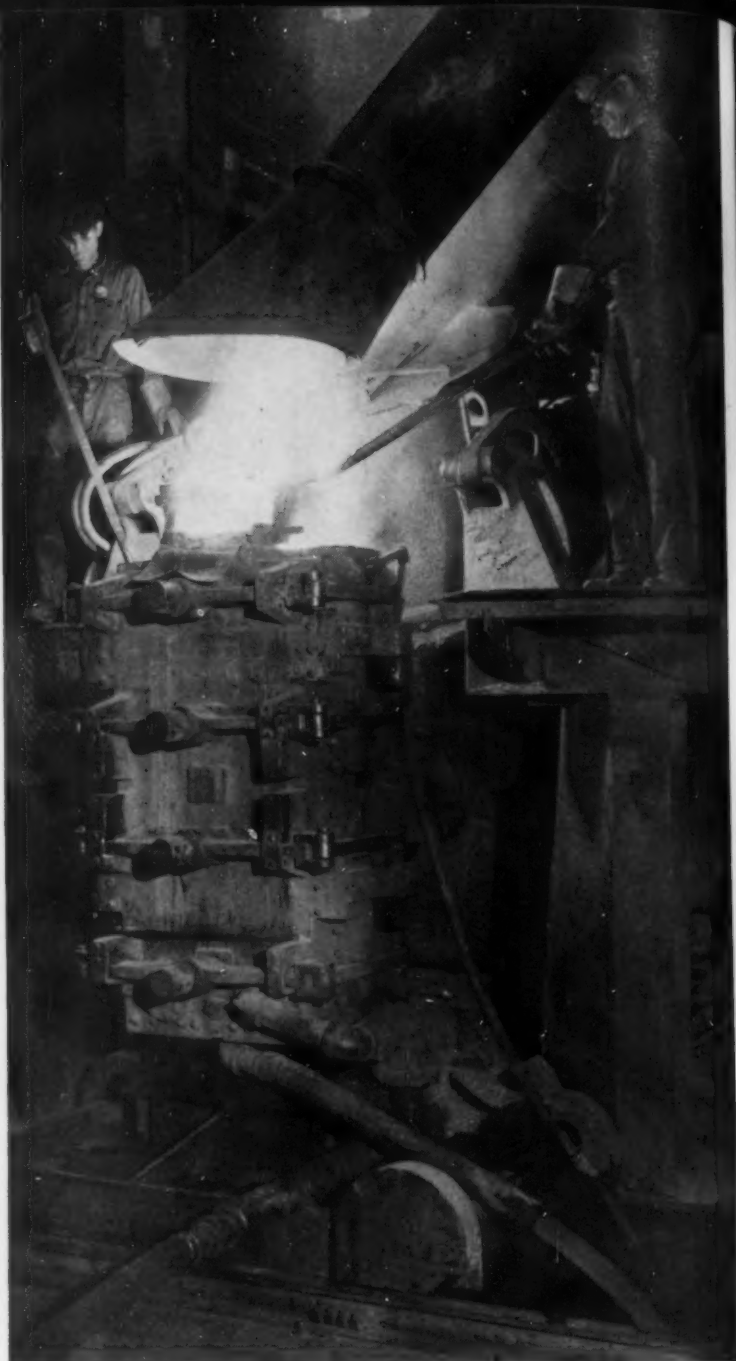
ELECTRO-mechanical drive is featured on this Lapointe single ram horizontal broaching machine.



EXPORTED from N. E. to N. J., this four-high aluminum foil mill was built by Farrel-Birmingham.

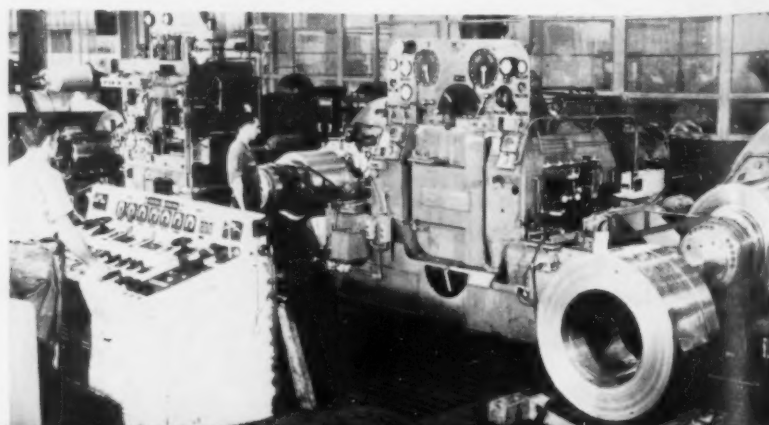


ALUMINUM window frames are welded by Wasco Flashing Co. with Thomson Electric Welder machine.

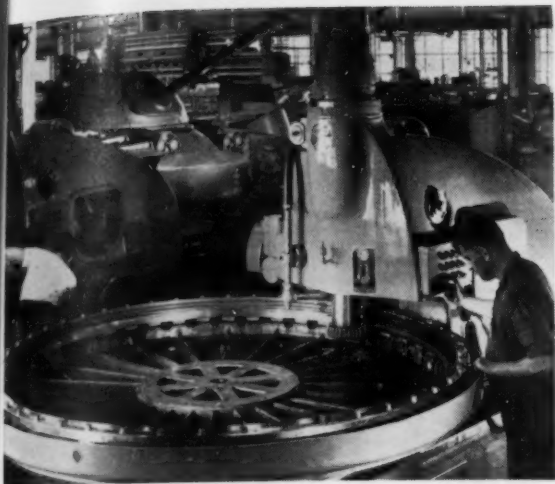


ART of metalworking has been handed down through the generations. This brass casting scene gives a bright view of Bridgeport Brass Co.'s contribution to N. E. metalworking. Company is completing a new tube mill which should enter production this month.

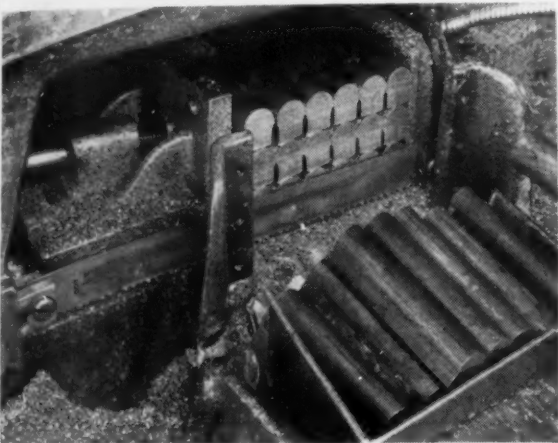
STAINLESS and carbon strip is rolled by Wallingford (Conn.) Steel Co. on this twelve-roll cluster Sendzimir mill. Use of continuous recording gages helps hold close tolerance.







DEFENSE production relies heavily on machine tools produced in N. E. Tank gears are shown being formed by a Fellows 120-in. gear shaper.



WORKHORSES in metalworking plants across the country are these power hack saw blades produced by Henry G. Thompson & Son Co. of New Haven.



HIGHSPEED grinding of a shell nose punch is achieved on a Norton Co. (Worcester, Mass.) Type C-2 Semi-automatic cylindrical grinding machine.



ONLY blast furnace in N. E. is operated by Eastern Gas and Fuel Associates in Everett, Mass. Furnace fills 90 pct of N. E. pig iron needs.



NEW three-stand high speed tandem flat wire rolling mill operates at speeds up to 2000 fpm at American Brass Co.'s Ansonia, Connecticut, plant.



FOUR grinding machine bases are shown being milled in one pass on a large planer-type miller at Taft-Pierce Manufacturing Co., Woonsocket, R. I.

# N.E. Leads in . . . Financial Resources and Innovations



About 13 pct of the resources of all  
U. S. financial institutions are in N. E. In  
addition the area has pioneered in state and  
community development corporations. These  
have boosted industry expansion in the area.

EVERY large city in the country can rightfully claim that it can offer the full range of financial services to its people and its businesses. Even smaller cities and towns can make similar claims by virtue of the correspondent banking system, which brings big bank services through local banks to smaller communities, and by

virtue of travelling representatives or agencies of the larger financial institutions.

Under such conditions, any special advantage enjoyed by any region must be based upon the quality of its services (which can be achieved, for example, by a higher degree of specialization) or by the performance of services not available elsewhere. On both counts, New England can claim some distinction.

New England, like most other areas of the country, offers a full range of financial services through its commercial and savings banks, insurance companies and investment companies. Its special advantage lies in the specialization it has achieved through the size of its operations in these traditional fields.

Financial institutions in the region in 1951 controlled \$35 billion in assets, or about 13 pct of the nation's total assets in such institutions. (The region had only a little over 6 pct of the nation's population.)

In investment companies, the region's share was 36 pct, and in life insurance and savings institutions, it was 20 pct.

Its insurance operations were, of course, nationwide, and its insurance companies grant no regional preference in making investments. Nevertheless, easy access to head offices affords the customer seeking to borrow a convenience of contact which can be helpful.

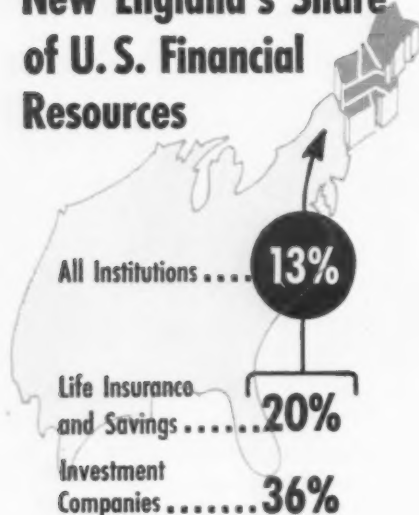
## Has Special Advantages

While the region accounts for no more than its share of commercial banking, the size and specialization of its leading institutions insure domestic and foreign services equal to any. Branch banking in five states has enabled the development of large and diversified institutions. In their trust department work, the leading New England institutions are recognized as outstanding and may have some peculiar advantages.

Because all of New England's financial institutions employ highly trained people who are available at salaries somewhat below levels in other leading financial centers, they can perform many routine functions at a cost which attracts business from outside the region. Because they have a volume which justifies a high degree of specialization, they can render service of top quality.

A second major advantage to

## New England's Share of U. S. Financial Resources



## Development Corporations Furnish Risk Credit . . .



**Dr. Alfred C. Neal**  
First Vice-President

Federal Reserve Bank, Boston . . .

**TRANSPLANTED Californian** is a pillar of strength in N. E. He's an industry booster who digs out facts to back his views.

which the region may lay claim is its "finance mindedness."

- It pioneered in the development of the insurance company, trust company, mutual savings bank, and investment company or trust.

- Its "prudent man" rule has permitted the flexibility and developed the capacity needed to manage other people's money.

- Its people derive a higher proportion of their income from property than do the people of any other region; they are stalwart defenders of private property.

- And, as you might expect, they save more per person—roughly, 50 pct more—than the average citizen in the country.

It is not surprising, also, to find that New England has pioneered in the development of new, risk-taking institutions designed to supply loans and capital not available from other sources.

Recognizing that income taxes were constricting sources of equity capital for new ventures, and that savings institutions of all kinds were obtaining a larger proportion of the personal savings of the country, some of the region's leading citizens set up new institutions to siphon off a small share of the funds of conservative institutions for risk financing.

The first of these was the American Research and Development Co., established as a closed-end

investment trust in 1946. Its specialty is new and growing enterprises so technical and risky that only expert professional appraisal can determine their potentialities. It had on December 31, 1953, investments totaling \$5.6 million, was operating in the black, and had paid its first dividend.

While its activities are by no means limited to New England, its location in Boston offers definite advantages to new companies in New England based upon technical and scientific developments.

More recently, development credit corporations have been set up in each New England state, beginning in Maine in 1949. These corporations are also designed to provide finance too risky for conventional institutions with funds derived from such institutions.

Each corporation is financed by the sale of its own common stock and by a borrowing capacity of from eight to ten times its own capital. The borrowed funds are

provided by member banks, insurance companies, and other financial institutions which, upon becoming members, obligate themselves to lend on call of the corporation as much as 2 or 2.5 pct of their own capital and surplus.

Thus, member financial institutions may conservatively make available through the development credit corporation a small proportion of their own resources to be used for risk financing. These institutions together have already put to work between \$2 and \$3 million in the region.

### Helping Industry

Finally, more than three dozen communities in the region have put up private funds to provide plant space for sale or lease to industry through local industrial foundations or industrial development corporations. These local corporations, which have had their greatest increase in numbers in the post-war period, have saved many a manufacturer the task of raising the capital to build a new plant and so have assisted in the financing of industry.

[An outstanding success of the local development corporations has been in inducing industrial diversification in one-industry towns. They have also achieved notable success in rebuilding an industrial base in communities which had suffered job losses from declining textile manufacture.]

Several other companies, wholly private, are prepared to design, build, and lease industrial plants to good name companies requiring new plant space. Such companies are building industrial centers on large suburban sites.

Thus, New England has a foot planted firmly in each camp: conservatism and risk taking. No wonder the Committee of New England was able recently to conclude that "in the operation of its financial system the limited available evidence indicates that New England's financial institutions more nearly meet the needs of business firms than those in the country as a whole."

### Pioneering Credit

Dynamic expansion of industry in New England is getting a strong lift from state and community development corporations. N. E. has pioneered this new type of financing to augment its leadership in conventional financial institutions.

Advantage of the development corporations is that they are able to make risk loans to industry that other financial houses couldn't handle.

Bulk of the funds actually come from banks and other conventional financial institutions which pledge a small part of their capital on demand.

Result: Risk is spread, and the door is opened to industrial loans that could not otherwise have been made.





# What Are the Industrial Opportunities in N.E.?

It is primarily men and only secondarily material resources which determine the economic level of a community. Here are tips to help you spot opportunities.

Since New England is one of the oldest industrial regions in the United States, its economic problems are those of maturity. If the region is to preserve a continuing high level of employment and income, it must adapt its industry to a changed technology by (1.) introducing new methods and new products, and (2.) by diverting resources from declining sectors of the economy to newer, growing industries.

The limits within which industrial opportunities must be sought in New England are established by a general understanding of its assets and liabilities.

New England occupies about 2.2 pct of the area of the U. S., and it houses about 6 pct of the population. Per capita income of the average New Englander is \$131 more than that of his fellow American and he has \$538 more in savings.

The region is poor in materials used in manufacturing, and it must rely heavily on outside sources. More than a third of the area's manufacturing depends on foreign raw materials, many of which are available from nearby Canada.

About one-fourth of New England's electric power is derived from hydro-electric installations. Three-fourths is generated from steam power in the area.

Because New England lies at the periphery of the national market, high transportation costs prevent

N. E. firms from entering the national market with heavy, high bulk products. There are many products, however, for which these costs are not significant.

New England's labor force contains many skilled workers who are essential in the growth industries. Wages of workers are often lower in N. E. than in competing regions. Labor costs are also favorable due to remarkable stability of the labor force.

Resources of capital in New England are more ample than in most regions of the U. S. (see p. 138).

Management in some industries has changed from the bold leader-

ship of early generations to one of conservatism. But the younger industries, such as electronics, chemicals and plastics, boast executives of vigor and ability, who have placed their companies in strong competitive positions.

Research facilities of N. E. are an asset in industrial development that is not surpassed by any other region (see p. 127). Close collaboration between industry and research organizations offers the region a unique and important advantage.

## Combine Electronics, Machinery

New England has an outstanding position in electronics, with 466 firms, or 15 pct of those in the \$5 billion industry. And expansion of this industry within the area is terrific (see p. 126). In a large sample of established firms employment rose more than 50 pct within the past 2 years.

Almost four-fifths of the region's electronics output is shipped outside N. E.

N. E.'s electronics strength is traceable to research, labor, and skillful management. Outlook for long-term growth is excellent. Rhode Island has already embarked on a well planned and progressive campaign to expand the electronics industry in the state.

Manufacture of non-electrical machinery is the second ranking industry in New England in number of persons employed (latest

## Key to Progress

An appraisal of New England's industrial opportunities inevitably comes back to the proposition that it is primarily men and only secondarily material resources which determine the economic level of a community.

N.E. has the human resources required for the task; she can get access to many of the material factors.

The method best calculated to harness material and human resources for the development of the region is systematic application of technical and economic research.



Dr. Richard M. Alt  
Arthur D. Little, Inc. . . .

BLENDs theory and field experience in economics. He is a pioneer in area development, both in this country and abroad. He has directed N. E. economic research projects.

figures show it first), income payments to individuals and value added in manufacture. With industrial growth shifting to newer industries such as electronics, the machinery industry must adapt itself to this new market if it is to continue to grow.

- Opportunities are to be found in electronics machinery designed to manufacture miniature components.
- Although the market is not large, manufacture of specialized medical equipment, such as the iron lung, is promising because of excellent medical resources of the region.
- High development of complex electronic computing machines at Harvard University and Massachusetts Institute of Technology may also offer a basis for commercial manufacture of office equipment.
- Special machinery and accessory equipment oriented specifically to the expanding jet aircraft engine industry, principally in Connecticut, opens up possibilities for manufactures of machine tools.
- Distillation machinery to enable production of drinkable water in arid areas of the world is another.
- Manufacturers of machinery in New England should seek opportunities which utilize skilled labor in the development of the more complex machine coming to be required by other industries.

The case for establishment of a cement plant is based on substantial freight savings for plants within the region over outside producers. There are adequate limestone supplies near tidewater.

The region now imports some 7 million tons of cement annually, and although the one cement plant in New England has recently expanded its production facilities by 50 pct, there still exists an adequate market for new facilities. Active interest is now being evidenced in establishing a new cement plant in the region.

A promising market awaits a small electric furnace mill for converting the region's scrap surplus to steel. New England metal fabricators of specialty steel products, who comprise one of the most rapidly growing sections of the region's economy, must now import most of their steel at transportation rates 59 pct higher than 1945.

#### Sees Other Opportunities

While the opportunities listed above have been singled out for specific discussion, there are others of equal importance, such as aluminum fabrication, titanium reduction, instrumentation, chemicals, pharmaceuticals, and many others. Brief comments on these follow.

Although power requirements

#### Signs of Opportunities

Here are some rules of thumb you can use to check on industrial opportunities in New England. Best opportunities are likely to be found in products satisfying one or more of these requirements:

- Need for Skilled Labor
- High Value Added
- Unique or Specialty Product.
- Need Management Ingenuity
- Small Bulk, High Value
- Material Base in Region
- Based on Local Market
- Origin in Technical Research

preclude establishment of an aluminum reduction plant in New England, consideration should be given to fabrication of primary shapes, such as sheets, rods.

Titanium ore is available from Sorel, Quebec, and could be shipped economically to New England. The feasibility of establishing reduction plants awaits further technical developments, which, however, are well advanced.

#### Needs Petroleum Products

New England is a major deficit area for refined petroleum products. The possibility of importing foreign as well as Gulf Coast crudes justifies further attention to this opportunity. Esso Standard Oil Co. has in the last 2 years expanded its N. E. facilities.

The area has long held an enviable reputation in the production of cutlery, hand tools, and general hardware. Because of the recognized quality of its output, production in this field can be further expanded by increasing the diversity of lines.

Because of New England's strength in electronics, the opportunity for expansion of instrument manufacture appears good. The field of atomic energy opens a vast area calling for completely new concepts of instrumentation. In this N. E. possesses some advantage, because use of radioactive isotopes in instruments is already well advanced.

#### Good Chance for Instruments

In the medical and surgical instrument field N. E. manufacturers can benefit from the concentration of medical facilities in this region and planned increases in hospital facilities in the next few years. N. E. is an excellent location for the manufacture of instruments, largely because of its high labor skills.

The chemical industry is among the most rapidly expanding industries in New England. Its present strength lies in two fields, bulk end products, such as sulphuric acid, fertilizers, and paints, for local consumption; and specialty chemicals with high value added in processing, utilizing skilled labor and technological supports.



# Copper and Brass Thrive in New England

Heart of the brass mill industry is still in the Naugatuck Valley where it started in 1802. About 42 pct of U. S. production takes place in the plants of N. E.



Theodore E. Veltfort  
Manager

Copper & Brass Research Assn. . . .

WORKED as an engineer, accountant, statistician, administrator. He is intimately acquainted with progress in copper and brass.

MANY leaders of business and industry regard New England's brass industry as the bellwether for the area's development into the important industrial and manufacturing region it is today.

While it doesn't ship steel-like tonnages, it is one of the important, basic metalworking industries of the nation with an annual production valued at more than \$1 billion. Interdependence of brass and New England is illustrated by the fact that approximately 42 pct of all copper and brass mill products produced in the U. S. are fabricated in New England.

Since copper and its alloys have been known and worked for some 5000 years, it's no surprise that they enter practically every phase of modern life, particularly in such fields as building construction, automobiles, communications, transportation and public utilities. They have important uses in practically every industry in this country.

National defense, too, is dependent on copper and copper-base alloys which are vital for a multi-

tude of applications in munitions, planes, tanks and ships for the Armed Forces. And whenever war or national emergency disrupts the economic life of the nation, it also disrupts the numerous important applications of these metals in everyday peacetime uses in industry and the home.

Industry uses these metals primarily because of their good corrosion resistance, high electrical and thermal conductivity, ease with which they can be formed and machined, and other desirable mechanical and physical properties.

## Started Making Buttons

Basically the brass mill industry comprises those companies which roll, draw, extrude or otherwise form sheet, strip, plate, rod, shapes, wire, tube, pipe and forgings of copper and copper-base alloys containing 40 pct or more of copper.

Principal raw materials of the industry are copper and zinc, and lesser amounts of lead, nickel and tin, as well as relatively small quantities of other alloying ele-

ments. The industry does not include producers of these raw materials, nor does it include foundries, or the producers of wire and cable for electrical transmission.

Why are the brass mills concentrated so heavily in New England?

It was in the Naugatuck Valley of Connecticut that the industry was born more than a century and a half ago with the manufacture of brass buttons in 1802. And there it grew.

Ready availability of timber and water power was responsible for the birth of the brass industry in Connecticut. Another reason often given to account for this original location was the ingenuity of the early settlers in working with brass.

Production of these metals in



the early days was not an easy matter and it required considerable skill and perseverance to perfect products that could compete with those that were being imported from England and other countries. Inventiveness and craftsmanship of brass mill workers are just as important today as they were when the industry was born—and they're just as evident.

Probably the greatest growth of the industry was made during the two World Wars. However, this growth and development has been equally remarkable in the period following the end of World War II. Many new plants have been constructed, and more and better equipment for the more efficient production of copper and brass mill products is continuing to be designed.

Brass mills are pouring millions of dollars into this expansion and

modernization—both a vote of confidence in the mutual future of the area and the industry and an insurance premium to assure that future.

Within the past 5 years American Brass Co. has spent millions in modernizing its Ansonia, Torrington, and Waterbury (Conn.) plants.

Bridgeport Brass is expected to start production on its new tube mill this month.

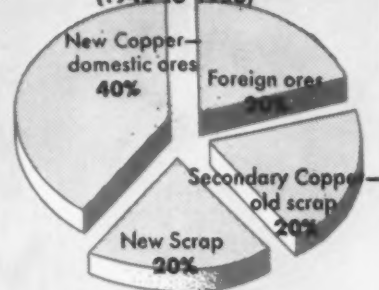
Chase Brass & Copper is making large investments for a variety of new equipment in its Waterbury plant.

From 1946 through 1953 Scoville Mfg. Co. has spent over \$36 million for plant improvement and expansion.

Bristol Brass Corp. has spent nearly \$2 million on plant improvements since the war.

## U. S. Copper Sources

(1945 to 1950)



Plume & Atwood Mfg. Co. recently broke ground for a new \$1.3 million plant.

These examples are typical of the brass mill industry. New and improved plants and equipment will assure an adequate supply of fabricated copper and its alloys for an expanding economy in war or peace.

## How New England Brass Mills Are Doing

Underlying factors of strength have turned brass mill business up again after a sluggish first quarter. Salesman after salesman contacted by THE IRON AGE confirmed the second quarter upturn. Increase is only moderate so far; it's still too early to apply any percentage comparisons.

First quarter sales volume was definitely off as a result of the post-Korea lull. One sales executive estimates his firm's first quarter business totaled 25 pct less than first quarter 1953. Another calculates mill operations at about two-thirds of capacity. Both are typical of the industry—and both are optimistic about the future.

**Markets . . .** Traditionally, the biggest users of brass mill products are the construction, automotive and electrical industries. How they're doing determines how good business is for the brass industry.

Construction is terrific, headed toward an alltime peak year in 1954—and taking more brass than ever before.

Right now, automotive business is mixed but still at good levels. Some automakers are producing

for all they're worth, others aren't doing so well. So metal business depends largely on which automakers buy from which metal suppliers.

Electrical equipment is down a little from last year, though in some lines it is topnotch. Booming air conditioning is an example—boosting the market for heat exchanger tube as well as small motors. One of the smaller New England copper mills is showing its confidence in the electrical industry's future by expanding in that direction only.

**Competition . . .** Brass mill products from Western Europe are undercutting domestic prices. Estimates of how much cheaper the delivered prices are range from 1½¢ to 8¢ per lb. While these imports total only about 2 pct of U. S. brass mill production, the competition is felt more heavily in some lines, such as free cutting brass rod, and especially along the East Coast.

As for competitive materials, aluminum seems to be making the biggest dent—but brass mills are now working the light metal. As

one executive in Connecticut's Brass Valley put it, "Aluminum is a new member of the family." One example is the marriage of aluminum fins and cuprous heat exchanger tubing, now a popular item for air conditioners.

And like the rest of American industry, competition among the brass mills has also heightened.

**Raw Materials . . .** Like their customers, brass mills have pared metal inventories to the bone. Only a few months ago the general expectation was that copper prices would fall. They haven't. And strength has crept into the market.

But supplies are more than adequate and copper producers are not operating full-tilt.

This is also true of supplies of all the important alloying metals except nickel which is used in small quantities for certain alloys.

As for scrap, the brass mills are getting all they want from their customers. While there has recently been an increase in scrap export, mainly for Japan, it isn't worrying the brass mills a bit since primary copper is easy.



# Measure Spending, Manufacturing, Saving

WHEN going after his "big story," any reporter will start "digging for the facts." Frequently this means statistics.

Statistics are a means of getting a lot of information to the reader in a hurry. And, if they are reliable statistics, they furnish him rapid measurement of the ideas

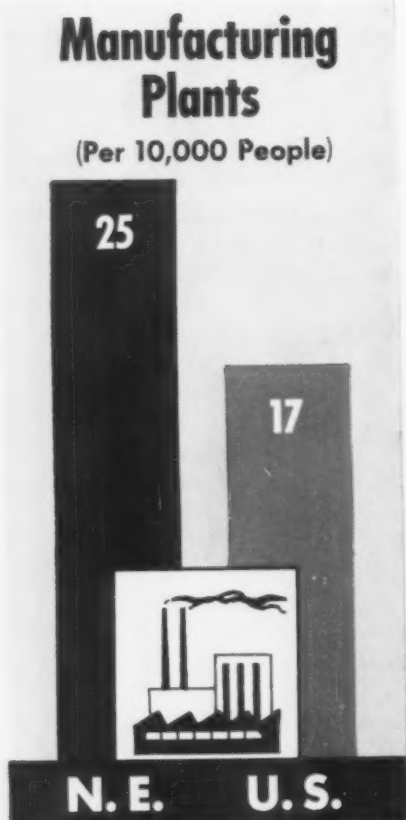
being presented by the author.

Nothing we could say would give you a quicker or better picture of New England's industrial leadership and high standard of living than these simple charts.

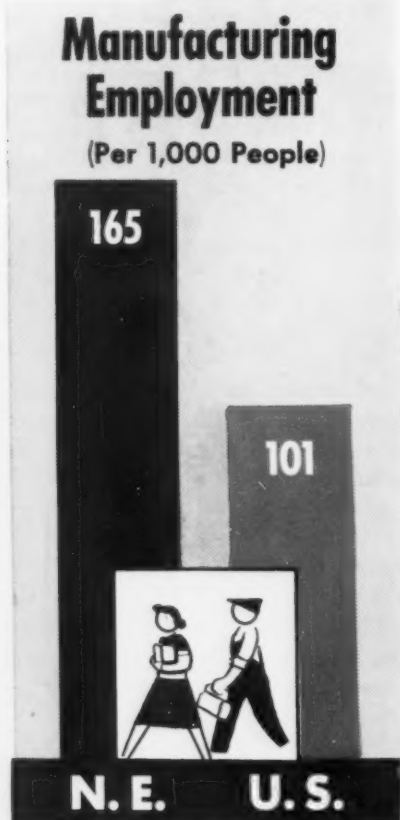
They tell you that New Englanders depend heavily on manufacturing, that they earn more, spend

more, and save more than the average of all Americans.

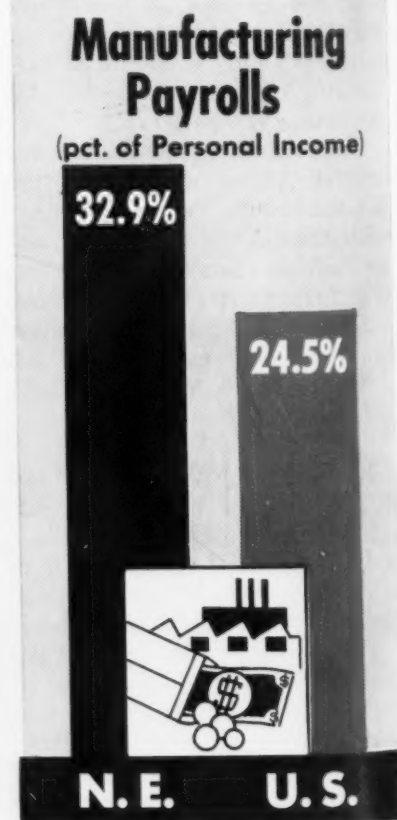
A high standard of living is indicated by the concentration of telephones in the area. Retail sales reflect spending power. Savings, life insurance, and bank deposits, are sources of capital and credit for expansion of business.



Source: N.E. Council, est., 1952

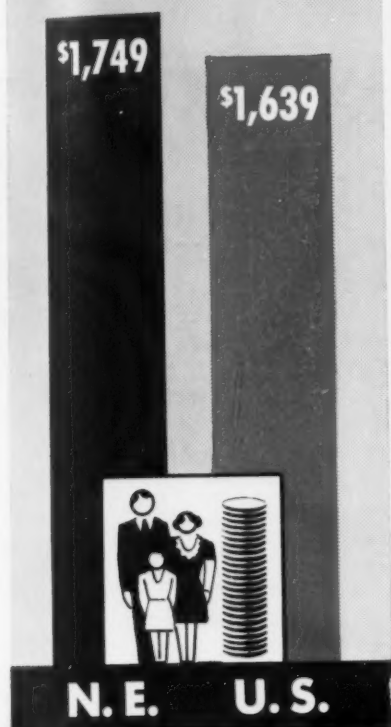


Source: U.S. Bureau of Labor Statistics, 1953



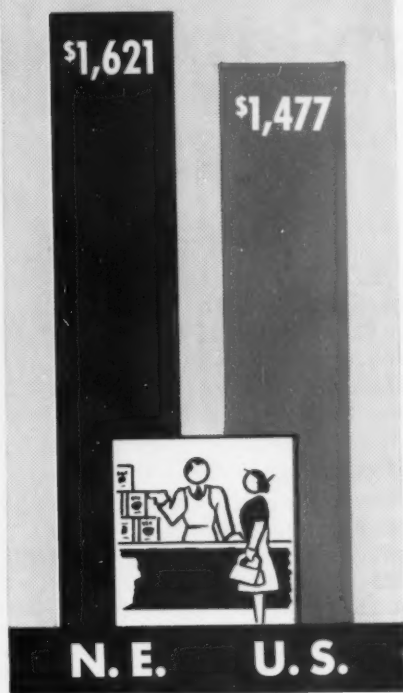
Source: U.S. Dept. of Commerce

## Per Capita Income



Source: U.S. Dept. of Commerce, 1952

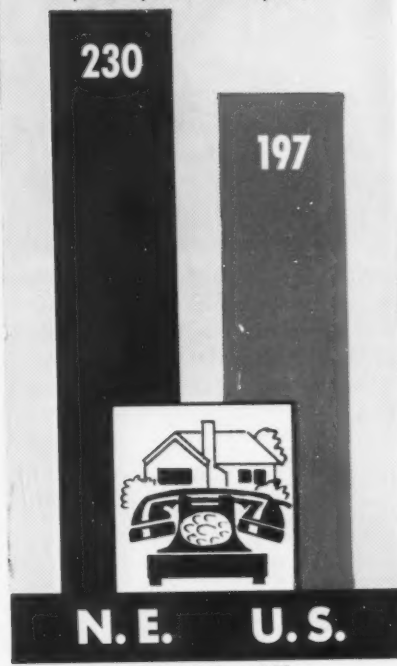
## Retail Sales (Per Capita)



Source: Sales Management

## Residential Telephones

(Per 1,000 People)



Source: N.E. Tel. & Tel. Co., 1953

## Per Capita Savings

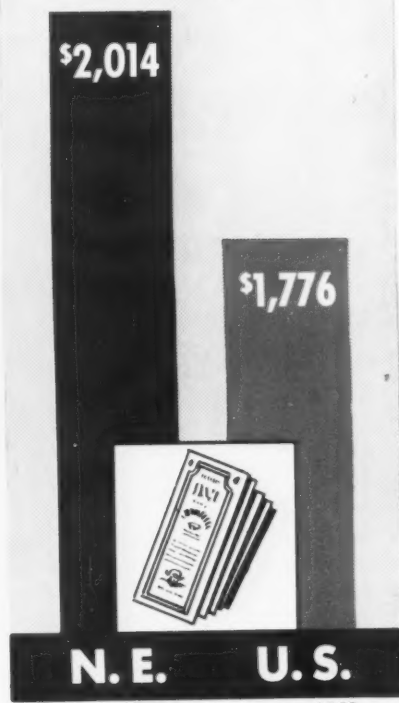


Source: Fed. Res. Bank, Boston, 1952

## Bank Deposits (Per Capita)



## Life Insurance (Per Capita)



Source: Fed. Res. Bank, Boston, est., 1952



# New England Newsfront—

*a look to the Future*

NEW ALLTIME RECORDS are being set for contract construction awards in N. E. during the first 4 months of 1954. Cumulative total through April is \$438 million, up 25 pct from last year, says F. W. Dodge Corp. April total was 30 pct higher than March, 64 pct higher than April 1953, and 26 pct higher than the previous record month (Dec. 1951).

NEW ENGLANDERS HAVE a very personal stake in development of atomic power plants (private firms will spend \$2.5 million this year). Competitive atomic power would overcome the natural handicap of freighting in coal. This would open the door to a wide range of new industrial opportunities.

THE ELECTRONICS BOOM is even more important to N. E. than it appears at first glance. In addition to mushrooming demand from other areas, N. E. electronics components are keying new developments in machinery, instruments, and machine tools. Electronics is destined to play an even greater role in future N. E. industry.

DURABLE GOODS MANUFACTURING employment has not slipped as much in N. E. as it has in the entire U. S. N. E. durable goods employment in March 1954 stood at 91.9 pct of March '53, compared with 90.4 pct for the U. S.

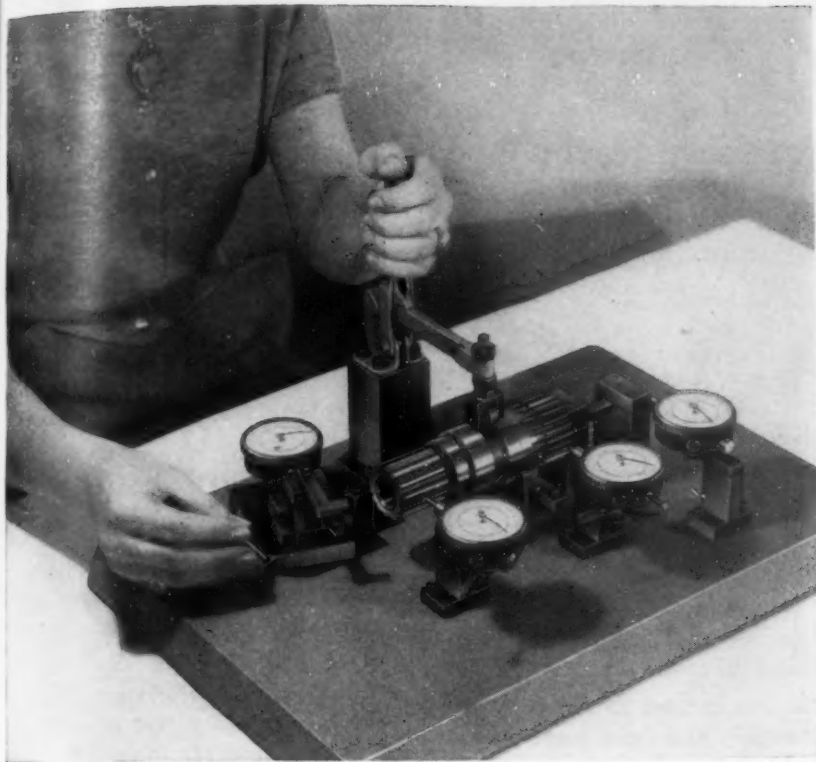
FOR THE FIRST TIME in more than a century a single segment of N. E. metalworking has topped textiles as the leader in employment. Textiles employment in March sagged below the 182,000 workroll of Yankee makers of nonelectrical machinery.

LOSSES OF TEXTILE MANUFACTURING in N. E., while still considered serious, are no longer viewed as regional calamities. Reason: they are more than offset by higher paying jobs in metalworking.

DEVELOPMENT CORPORATIONS, PIONEERED in N. E., are achieving success in industrial diversification of one-industry towns. Trend will grow.

EXPANSION OF N. E. METALWORKING is noted by its suppliers. A well known steel warehouse, which recently opened a branch in the area, has found business better than expected. It is contemplating a new expansion.

BRASS MILLS WILL INCREASE their fabrication of aluminum, as they are convinced adopting the competitive metal as a member of the family was a wise move.



**Four Gear Measurements at a Glance!** This special set-up of four standard Federal Dial Indicator Gages measures concentricity of pitch diameters of two sets of teeth . . . checks concentricity of end holes against body's O.D. This simple gage is entirely adequate for the problem involved.

## Don't Control Dimensions the Hard Way!

Many metal-working firms have found that from a final cost standpoint they can usually get fast, accurate inspection without the greater expense of elaborate gages requiring a lot of special auxiliary equipment. As they put it, "Why use a *man* on a *boy's* job?" Any engineer, production supervisor or inspector who considers all angles of a gaging problem realizes that top efficiency lies in careful selection of the Gage best suited to the requirements.

**The key to simplified dimensional control** on most special jobs is adaptation of standard Federal Dial Indicating Gages, as shown in our Catalog 52. Your production and quality control engineers may have it in their files. If not, they should. However . . .

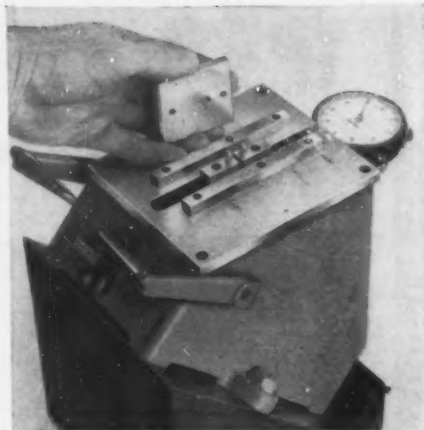
**There's a quicker, easier way** to learn whether a special modification, or combination, of Federal Dial Indicating Gages can simplify your complicated dimensional-control jobs. Just call in a Federal sales engineer. His recommendation is sure to be practical and unbiased. That's because he's backed by a *complete* line of *modern* gages . . . Dial Indicating, air, electric and electronic designs.

**You, too, may save time and money** by investigating Federal Gages before you make up your mind on any others. There's no cost or obligation involved in talking things over with a Federal sales engineer. A date will be set by return mail. Why not write today? Federal Products Corporation, 4135 Eddy St., Providence 1, R. I.

# Ask **FEDERAL**

**FOR ANYTHING IN MODERN GAGES...**

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Machine Size Control.



**Center Distances Easily Gaged!** This gage shows accuracy of hole locations to the ten-thousandth of an inch. It's a regular Federal Catalog Gage (I.D.-O.D.), modified for this special job and is entirely satisfactory for its purpose.



**Greater Quantities and Close Tolerances Warrant Use of Air Gage.** This gage is similar to the one illustrated at top except that it is gaging the I.D. of a ball race and has in addition a Federal Dimensionair (Air Gage).



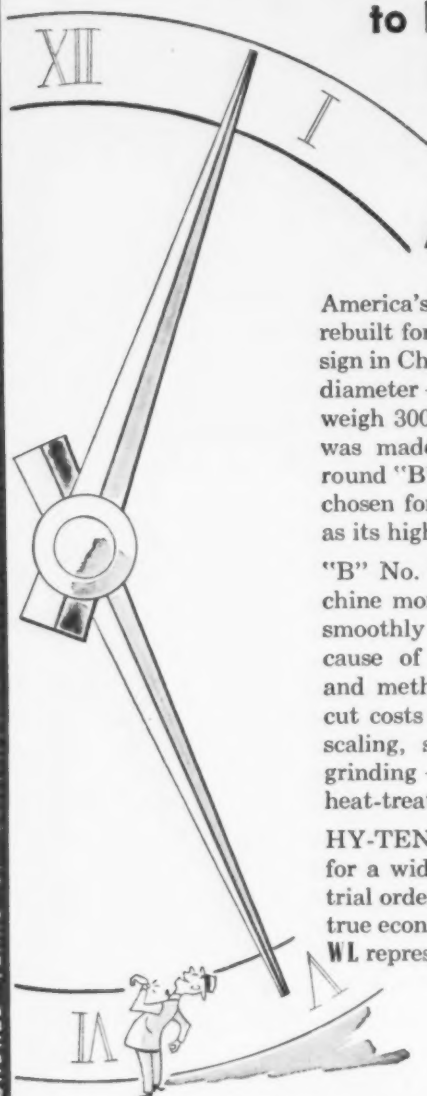
**Checking Radial Play Is Easy Work!** This dead weight Federal Dial Indicator Gage measures assembled roller and ball bearings for radial play between outer and inner races. Two quick hand motions and two accurate readings determine play in increments of .0001". Simple and reliable.

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"B" No. 3X heat-treated bars machine more readily and finish more smoothly than standard alloys because of their particular analysis and method of manufacture. They cut costs by eliminating distortion, scaling, straightening — and often grinding — as well as the cost of heat-treating finished parts.

HY-TEN "B" No. 3X bars are used for a wide range of applications. A trial order will convince you of their true economy. Just call your nearest WL representative.

Write today for your FREE COPIES of Wheelock, Lovejoy Data Sheets, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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—Salute to N. E.—

## Studies:

**Inventory of recent economic research on New England.**

A wealth of economic research on New England is constantly being turned out by a number of organizations.

Many of the studies can be useful tools to decision-making management.

A synopsis of the research being done is regularly collected and published by the Federal Reserve Bank of Boston in its Quarterly Inventory of Economic Research of New England.

THE IRON AGE has been granted special permission to present this edited digest of studies of special interest to metalworking industries.

### Banking and Finance

The Financing of Small Business in New England: Opinions of Members of the Smaller Business Association of New England. Staff Memorandum No. 6. The Committee of New England of the National Planning Association, 1952.

Copies available from the Federal Reserve Bank of Boston, Research and Statistics Department.

Financing experience and needs of small businesses, primarily manufacturers, and their opinions

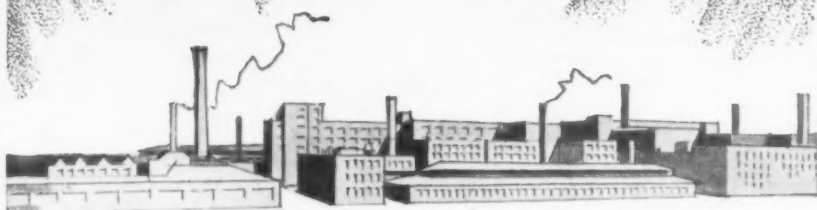


"If this stubborn V-Belt doesn't slip on pretty soon I'm going to try using the correct size!"



# WHERE PRECISION IS A HABIT

...over a  
hundred years old



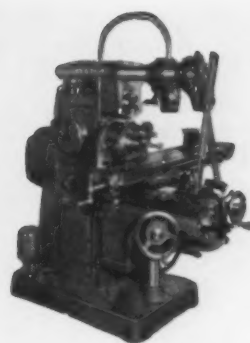
For More Than a Hundred Years, every Brown & Sharpe precision tool has been designed and manufactured to be the finest in its respective class . . . the perfect end-product of precision manufacture. And the fine workmanship that made such high standards possible has been constantly improved over the years until today Brown & Sharpe products are symbols of precision . . . known and used the world over.

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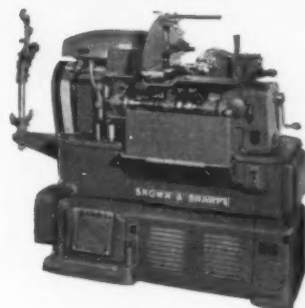
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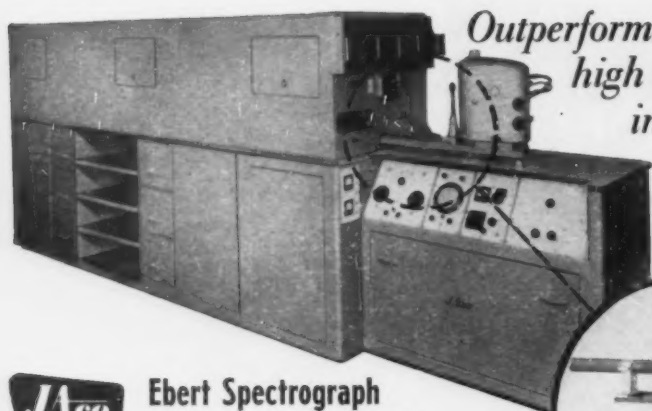
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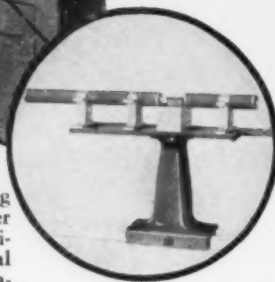
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## —Salute to N. E.—

on the adequacy of existing financial institutions and procedures in meeting the needs of small business, based on a special survey by the Committee.

The Financing of Small Business in New England: Findings of the National Association of Manufacturers. Staff Memorandum No. 7. The Committee of New England of the National Planning Association, 1952.

Copies available from the Federal Reserve Bank of Boston, Research and Statistics Department.

Comparison of the Financing experience and opinions of small manufacturers in New England and the United States, based on a special tabulation of New England responses to the National Association of Manufacturers in its 1950 study, Financing Small Business.

### Business

#### New Businesses

Market Appraisal for New Businesses, by Cyril C. Herrmann. In Monthly Review, July, 1953. Federal Reserve Bank of Boston, Research and Statistics Department, 1953.

Study of the methods of market survey appropriate to new business firms, including a checklist of market factors for appraisal by new firms.

Ideas for New Business Firms, by Cyril C. Herrmann. In Monthly Review, June, 1953. Federal Reserve Bank of Boston, 1953.

A study of the sources of new ideas for new business firms, including a checklist of sources and a guide to the selection of new ideas.

#### Construction and Housing

Quarterly Survey of Seven Building Trades. U. S. Department of Labor, Bureau of Labor Statistics, Boston Regional Office, 1953.

Tabulation of union wages for different business trades in selected cities in the six New England States as of October 1, 1953.



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Promises are a  
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### Small Business

Detailed Notes of the 15th Annual Smaller Business Conference, by William B. Sadtler. Massachusetts Department of Commerce, Division of Research, 1953.

Reference copies available at the Massachusetts Department of Commerce.

Detailed notes of the 15th annual Smaller Business Conference of the Smaller Business Association of New England, held in Boston, October 7, 1953. Includes complete text or outlines of prepared addresses and notes of the important panel discussions.

### Distribution and Services

#### Market Data

Distribution Data Guide. U. S. Department of Commerce, Office of Distribution, 1954.

Monthly publication starting March, 1954, describing selected basic Government and non-Government publications of significant interest in the field of distribution which are generally available to the public on terms described.

1954 New England Market Data for 47 Cities. New England Newspapers Advertising Bureau, 1954.

Copies available free to manufacturers and advertising agencies.

Facts and figures on 47 retail markets in New England on a city by city basis. Includes data on population, housing, labor force, manufacturing, trade, retail sales and outlets, income distribution, school systems, hospitals, transportation systems, climate and miscellaneous indexes of standard of living. In addition it lists merchandising services rendered by each of 48 newspapers together with national advertising rates in each newspaper.

### Economic Conditions

The New England Business Cycle. U. S. Office of Price Stabilization, Hartford (Conn.) Regional Office, 1953.

Description of long-term as well

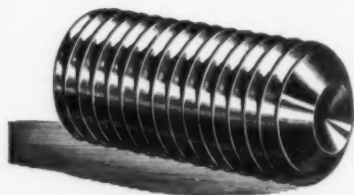
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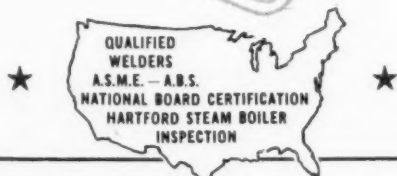
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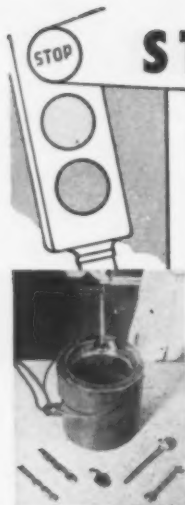
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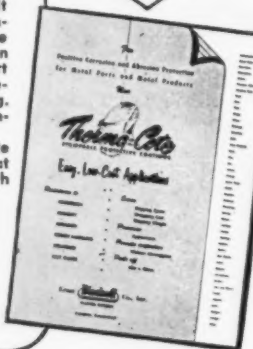
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## —Salute to N. E.—

as annual fluctuations of business activity, with emphasis on the typical short-term commercial cycle as found in activity data of 1923 to 1953.

### Economic Conditions

An Introduction to the Economy of Rhode Island, by Elmer C. Tanner. Rhode Island Development Council, 1953.

Inventory of Rhode Island's current resources including basic economic facts about industry, labor, labor organizations, natural resources, taxation, and future industrial planning. Designed as basis for state planning and promotion and for general information.

Analysis of the Economy of Maine—1950, by George H. Ellis. Federal Reserve Bank of Boston, 1950.

Copy on file at the Federal Reserve Bank of Boston Research Library.

Brief analysis of the population, income, labor force and manufacturing employment record of Maine in the years since 1929.

Dynamic New England. In New England Letter, June 30, 1953. First National Bank of Boston, 1953.

Discussion of the major readjustment of New England's basic industries from a textile-based economy to one in which metal industries predominates.

Turn to page 158

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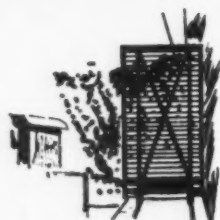
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## — Salute to N. E. —

### Studies

(Continued)

1953 Review of the New England Economy. U. S. Department of Labor, Bureau of Labor Statistics, Boston Regional Office, 1953.

Review of economic developments in New England during the year based on labor statistics for employment, wages, prices, and construction.

Should Industry Move South? In Harvard Business Review, September-October, 1953. Harvard University, Graduate School of Business Administration, Division of Research, 1953.

Reprints available at \$.40 each.

Analysis of the trend among Northern firms to relocate in the South leading to positive conclusions for remaining in their present sites.

### Government Finances

#### Defense Spending

The Defense Program and New England. In Monthly Review, March 1954. Federal Reserve Bank of Boston, Research and Statistics Department, 1954.

Analysis of expenditures in New England for national defense, including military construction, from July 1, 1950 to January 1, 1954. Discussion of the distribution of spending and certified plant expansion among major industry groups and states and the effect of a decrease in such spending.

### Industry

Available Plant Space. Vermont Development Commission, 1954.

Survey of what Vermont has to offer manufacturers looking for plant space, including specifications for plants in the smallest and largest communities.

### Labor

#### Employment and Payrolls

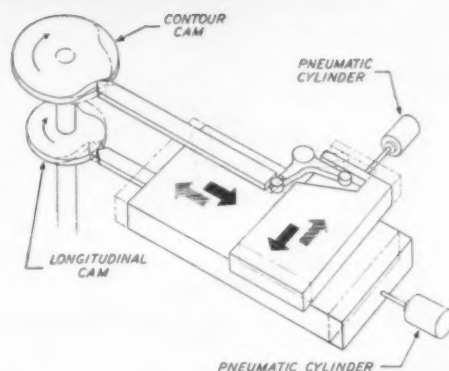
Machinery Industry: Boston Massachusetts; Hartford, Connecticut; Worcester, Massachu-

Turn to Page 166

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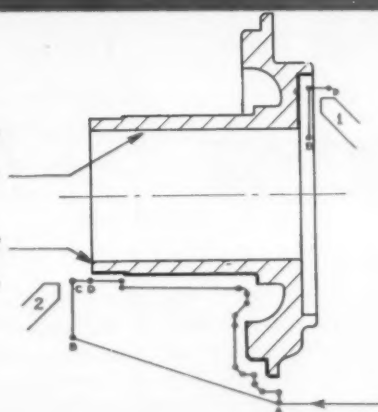
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June 24, 1954

165





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### Studies

(Continued)

setts. U. S. Department of Labor, Bureau of Labor Statistics, New England Regional Office, 1954.

Survey of approximately 70,000 workers in the 3 cities covering occupational earnings, fringe benefits, method of pay, minimum entrance, and job rates.

Massachusetts Employment, Hours and Earnings. Massachusetts Department of Labor and Industries in cooperation with U. S. Department of Labor, Bureau of Labor Statistics, New England Regional Office, 1954.

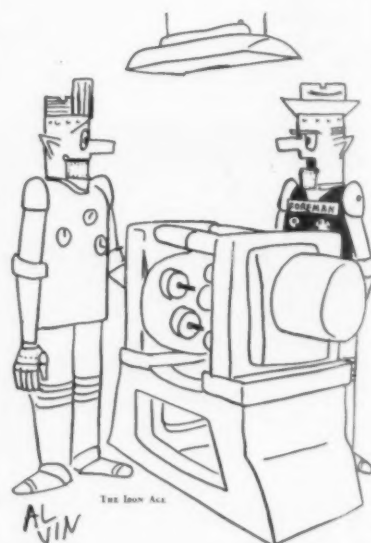
Copy available from U. S. Department of Labor, Bureau of Labor Statistics, New England Regional Office.

Historical series covering Massachusetts non-agricultural employment 1939-1953, average weekly manufacturing earnings 1950-1953, average hourly manufacturing earnings 1950-1953, and average number of hours worked per week in manufacturing.

### Employment Conditions

Employment in New England: Part I—How Did Employment Change, 1947-1953? and Part II—Effects of Employment Changes.

Turn to Page 172



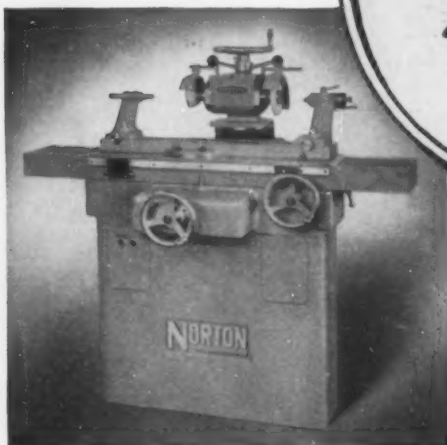
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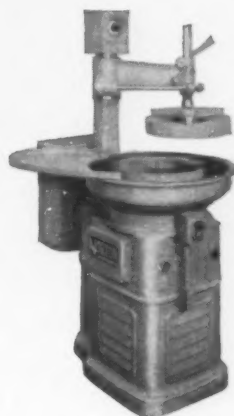
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## — Salute to N. E. —

### Studies

(Continued)

Monthly Review, January 1954 and February 1954. Federal Reserve Bank of Boston, Research and Statistical Department, 1954.

Description of changes in employment in New England industries since 1947, reasons for the shifts which occurred, and an analysis of the effects of these changes on the New England economy.

Seasonal Patterns in New England Employment. U. S. Department of Labor, Bureau of Labor Statistics, New England Regional Office, 1954.

Month-to-month fluctuations in New England employment since 1939, and by industry group since 1947.

### Wage Rates

Boston Occupations Wage Survey. U. S. Department of Labor, Bureau of Labor Statistics, New England Regional Office, 1954.

Preliminary report: February 28, 1954. Final report: June 25.

Earnings information for industries and major industry division on office, professional, technical, maintenance, power plant, custodial, warehousing and trucking jobs. Also data on holiday pay, vacations, work schedules, shift differentials, and insurance and pension plans.

Wage and Fringe Benefit Practices in Selected Electronic Research Establishments, Boston Area, March, 1954, by William H. Miernyk. Northeastern University, Bureau of Business and Economic Research, 1954.

Survey of wage and fringe benefit practices in establishments engaged in research and development in the Greater Boston area. Rate ranges are given for key technicians and machinists.

### Employment Conditions

Causes of Industrial Peace un-

**Turn Page**





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### — Salute to N. E. —

der Collective Bargaining — Case Study on Lapointe Machine Tool Company and Local 3536, United Steelworkers of America (CIO), by George P. Shultz and Robert P. Crisara. Massachusetts Institute of Technology, Industrial Relations Section. Prepared for the National Planning Association. 1953.

Copies are available from the National Planning Association.

A detailed analysis of a union-management relationship which has achieved industrial peace, with an attempt to show what the causes of peace in this case are.

Employment in New England. U. S. Department of Labor, Bureau of Labor Statistics, Boston Regional Office, 1953.

Limited supply.

Continuous historical series statistics for total non-agricultural employment in New England by months from January, 1939, to August, 1953, with breakdowns for durable-nondurable, and industrial employment in manufacturing.

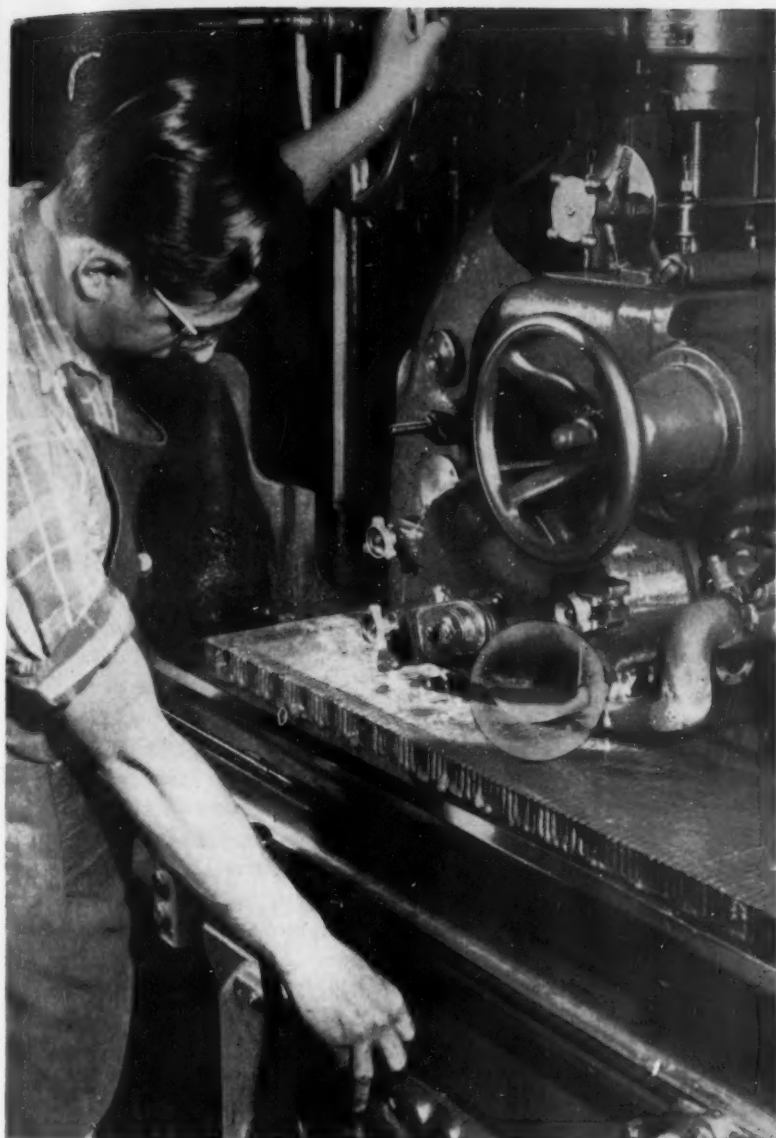
Wage and Related Practices—Ferrous Foundries. U. S. Department of Labor, Bureau of Labor Statistics, Boston Regional Office, 1953.

Statistical data on selected occupational and related information on ferrous foundries including straight-time hourly earnings for selected areas in New England (Boston, Mass., Hartford and New Britain-Bristol, Conn.).

Turn Page



"He says he won't work until you double his pay."



"The new G Bond ALUNDUM\* wheels give us double the production of former standard wheels." That's how a Massachusetts manufacturer sums up the performance of the new Norton wheels in grinding hardened high-speed steel textile blades. He adds: "Wheels used on this job must be very free and cool cutting to avoid warping and burning the very thin stock."



"I get a fast cut and good finish. They're the best and most versatile segments I ever used for this kind of work and I'm re-ordering ten sets," reports an Illinois customer using G Bond segments for surface grinding mild steel, cast iron and Meehanite — all three.



Making better products... to make other products better

June 24, 1954

*These users say:*

**For surface  
grinding,  
the new  
G BOND  
beats them all!**

*Latest Norton wheels bring  
you the money-saving  
"TOUCH of GOLD"*

Naturally, we've kept close watch on how the new G Bond wheels are doing. And we can report that throughout the range of precision and semi-precision grinding applications they're already way out in front. In the field of surface grinding, for instance, a composite statement by users of the new G Bond would run very much like this:

"G Bond wheels cut freer, cooler, faster — enabling us to take heavier cuts in costly high speed steels without drawing temper. They give us closer tolerances and smoother finishes. They dress easier and produce more pieces per dressing. Doing more work and a greater variety of work — per wheel, they outlast any wheels we ever used before."

#### **G Bond Wheels for YOUR Surface Grinding**

will bring new speed and economy to surface grinding jobs — thanks to their unique grain-holding structure that produces greatly improved cutting action. Remember, the G Bond is the most modern, most efficient vitrified bond ever developed — a typical Norton "Touch of Gold" achievement that steps up grinding performance and product quality while cutting grinding costs.

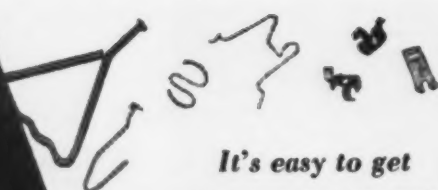
#### **See Your Norton Distributor**

for the ALUNDUM G Bond wheels, cylinders and segments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. Export: Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

W-1537

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries





It's easy to get  
**HIGH PRODUCTION**

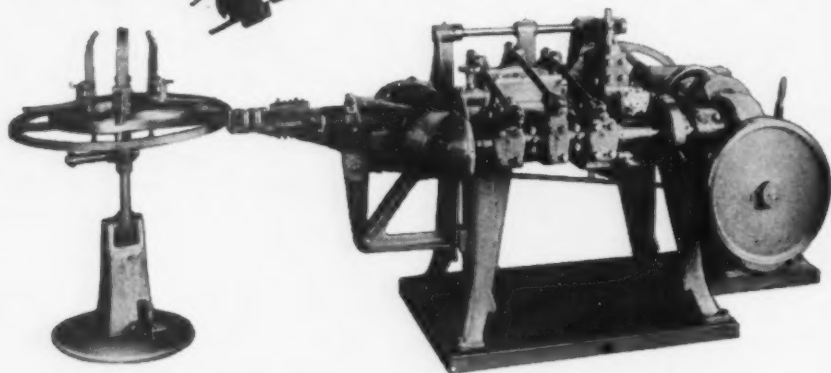
... and **UNIFORMITY, too!**

## Wire and Ribbon Metal FORMING MACHINES

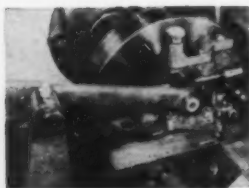
**UNIFORMITY** in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on **NILSON 4-SLIDES**, it means control of the material from the coil to the final form.

Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with **NILSON'S** open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

Model SF3 **NILSON 4-SLIDE**, shown below, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.



Close-up of the **NILSON** forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.



Close-up of the **NILSON** feed mechanism... capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

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**Wire Forming**  
1/32" through 1/2" wire.\*  
Feeds up to 32".

**Ribbon Stock Forming**  
1/8" through 3 1/2" wide material. Capacity of press section 5 to 30 tons; 50 to 75 tons in heavy duty types.

For specific recommendations — send details of your operation.

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Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

## — Salute to N. E. —

Connecticut: The Labor Situation. Connecticut. Labor Department, Employment Security Division, 1953.

Special Survey—as of March, 1953—of Labor in Connecticut as to number of workers, average age, earning, etc. Includes tables and charts.

Index of Manufacturing Employment Manhours in New England. U. S. Department of Labor, Bureau of Labor Statistics, Boston Regional Office, 1954.

This index is designed to show the month-to-month change in rate of labor utilization in New England mills and factories. It will measure, relative to the average month of 1950 (base year), current monthly production-worker manhours in total manufacturing and in durable and non-durable goods production. It should be more sensitive to changes in manufacturing activity than is a simple employment index. It should reflect over- and under-time worked.

### Labor Relations

Case Study in Human Relations: What Is It and What Can It Do? By Paul Pigors. Massachusetts Institute of Technology, Department of Economics and Social Science.

Completion date: 1954. To be published by McGraw-Hill.

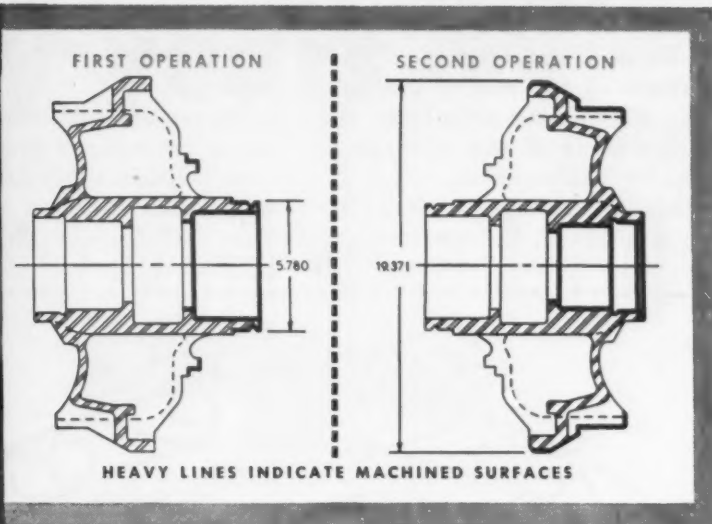
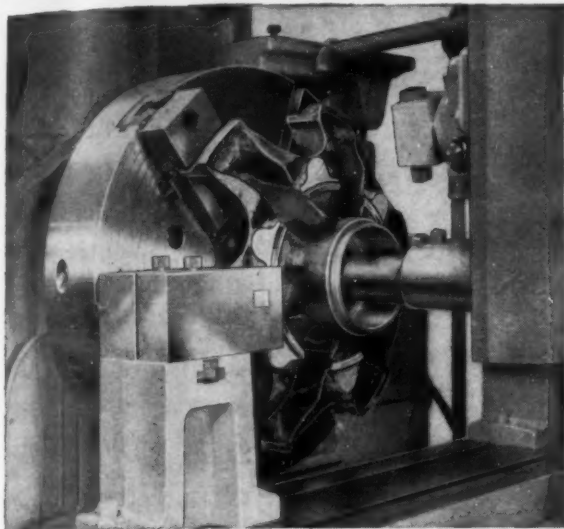
A study of the application of the two component parts of case method, fact-finding and generalizing from experience, to administrative practice. The study is based on field studies made in industrial concerns and suggests that specially prepared cases can be used effectively by top executives to evaluate the quality of personnel relations as well as to disclose inconsistencies between policy statements and daily experience at the work level.

### Management

The Foreman, Part of the Management Team. Master's thesis by Michael P. Szwed. University of Rhode Island, Department of In-

Turn to Page 180

# BIG TRUCK WHEELS ARE TURNED *FAST*

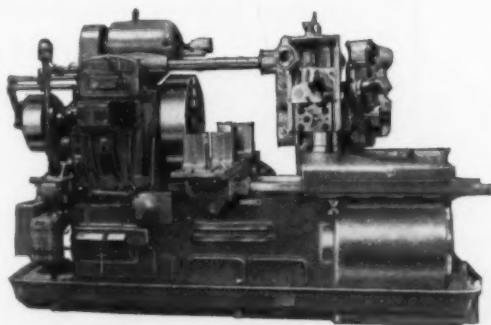


BY THE

POTTER & JOHNSTON

**6-DRE** *Automatic Turret Lathe*

Tooling to machine this cast steel truck wheel, P&J Engineers used pilot bars engaging a bushing in the main spindle center for extra boring tool support. In addition the massive turret slide and the overhead pilot construction of the Model 6-DRE gave ample turning tool rigidity. Four automatic speed changes and three automatic feed changes were selected to provide the most effective cutting speeds. Cross slide tools permitted multiple machining for further time savings. In the second operation, piece clamping was by air operated fingers located between the spokes, pulling the work against a ground positioning plate. Here, positioning accuracy, equalized clamping pressure and fast action contributed greatly to close tolerance, high performance work.



Over 50 years of production know-how went into the high quality and economy of automatic operation in this typical example — one more tribute to the versatility and capacity of P&J automatic chucking and turning machines. Bulletin 128, yours for the asking, gives details of the Model 6-D machines. If you prefer, get your facts from the nearest Pratt & Whitney Branch Office — or send us your parts or prints for estimating purposes. There is never any obligation.



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## Salute to N. E.

### Studies

(Continued)

dustrial Management, 1953.

Copy on file at the University of Rhode Island Library.

Study of the role of the foreman, his training, techniques, and a case study of one company in the New England area.

Annual Survey of Manufactures, 1951. U. S. Department of

Commerce, Bureau of the Census, 1953.

Cost \$2.25 per copy. Copies may be ordered from the U. S. Government Printing Office, Washington, D. C.

Survey of basic industrial measures for industry groups, important individual industries, and for geographic divisions and states. Also includes, for the first time,

summary of individual products statistics based on the 66 Census monthly, quarterly and annual commodity surveys.

**Bringing the Future into Focus—The Growth Expectancy of Industry to 1960.** The Eddy-Rucker-Nickels Company, 1954.


Copies available at cost of \$.50 each.

Shows long-term growth of manufacturing industry and the relationship of capital and production in chart form (all manufacturing combined). Provides a table for projecting to 1975 and intervening years an average firm's capital assets, number of employees, as well as capital, productivity, and pay per employee. The average firm's growth plans are discussed in relation to product improvement, sales promotion and production.

A Survey of New England's Electronics Industry. In Monthly Review, October, 1953. Federal Reserve Bank of Boston, Research and Statistics Department, 1953.

Survey of New England's electronics manufactures to ascertain the advantages and disadvantages of New England locations for the growth of the industry here.

Turn to Page 184



*The Southern Gateway  
to and from industrial New England*

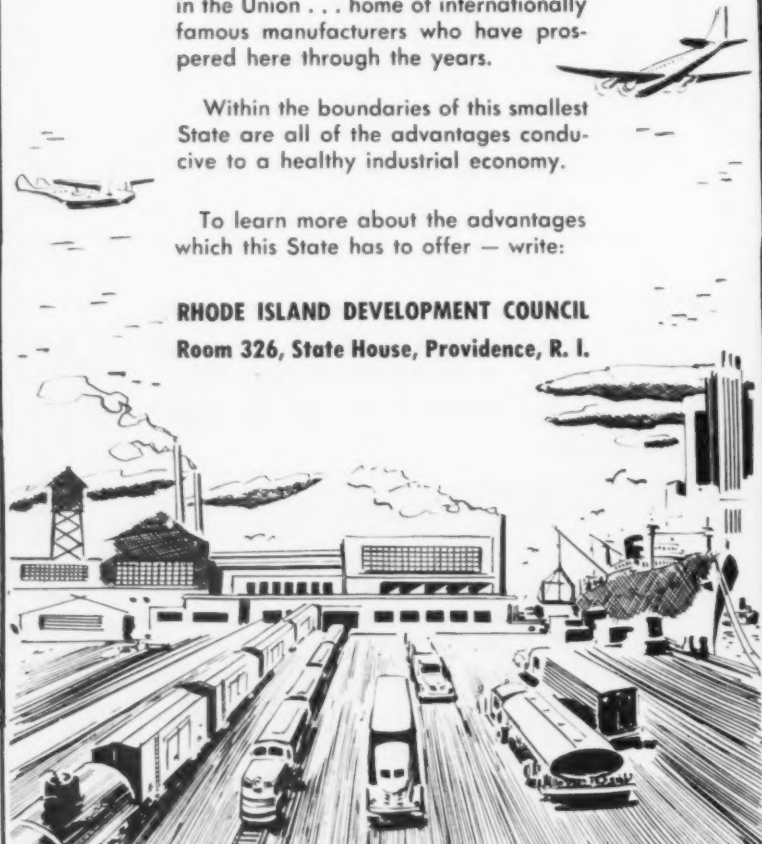
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Since 1636, R. I. has been and continues to be the most industrialized State in the Union . . . home of internationally famous manufacturers who have prospered here through the years.

Within the boundaries of this smallest State are all of the advantages conducive to a healthy industrial economy.

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Room 326, State House, Providence, R. I.





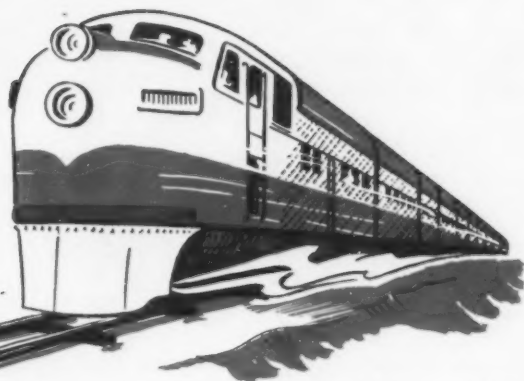
"Mullins, get in there for old Robinson."



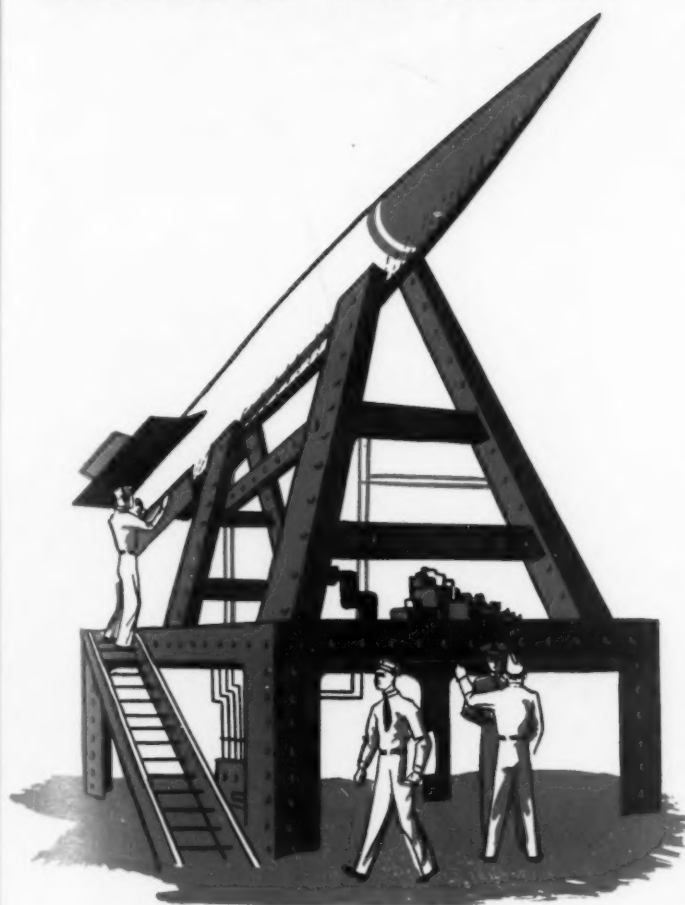


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The year 1954 marks the 76th anniversary of The Seymour Manufacturing Co. — an industry founded in the reconstruction years following the Civil War but slated for ever-increasing activity in both peace and war.

From a few hundred feet of floor space, and meagre equipment and personnel capable of producing a few thousand pounds of nonferrous alloys in a day, The Seymour Manufacturing Co. has grown to international scope, with several factories, 400,000 feet of floor space and over 800 employees.

While the products of an earlier day went into the limited utilities of that time, those of Seymour today cover a wide bracket of use: In radio and TV equipment, scientific instruments, flatware and zipper metal, electrical devices and appliances, and discs for shell casings, atomic energy and many other war items.

Seymour basic products include:

**NICKEL SILVER** — an alloy of copper, nickel and zinc, silvery white in color, highly ductile, tough and corrosion-resistant.

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**NICKEL ANODES**, in all shapes and formulas for modern plating. Also, Anodes of copper, brass and other underplate alloys.

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## SEYMOUR

**THE SEYMOUR MANUFACTURING COMPANY**

SEYMOUR, CONN.

**Nickel Silver • Phosphor Bronze • Nickel Anodes**

**NONFERROUS ALLOYS SINCE 1878**

**Studies**

*(Continued)*

A Directory of Maine Manufactures, 1952-1953. Maine Department of Labor and Industry, Division of Research and Statistics, 1953.

A directory arranged in geographical order, keyed to show approximate number of employees, and containing index listing manu-

facturers by type of industry.

Industrial Opportunities in New England: Fiberglas and Reinforced Plastics. In Monthly Review, February, 1953. Federal Reserve Bank of Boston, Research and Statistics Department, 1953.

Seventh in a series of abstracts from the Arthur D. Little, Inc., report on industrial opportunities in New England. A study of the

production and uses of fiberglas in fabrics and as a filler for reinforced plastic. Analyzes New England's position in this growing field.

Industrial Opportunities in New England: Instruments. In Monthly Review, March, 1953. Federal Reserve Bank of Boston, Research and Statistics Department, 1953.

Eighth in a series of abstracts from the Arthur D. Little, Inc., report on industrial opportunities in New England. A study of the present and potential development and manufacture of scientific and professional instruments in New England.

1952 Annual Survey of Manufactures: New England States—General Statistics by Major Industry Groups: 1952, 1951 and 1947. U. S. Department of Commerce, Bureau of the Census, 1953.

Cost: \$.10 per copy.

Data on employment, man-hours, payrolls, and value added by manufacture based on manufacturers' reports.

**Population**

Population and Labor Force of the New England-New York Area, by Robert L. Wrigley, Jr., U. S. Department of Commerce, Office of Industry and Commerce, Area Development Division, for the New England-New York Inter-Agency Committee, 1953.

A general review of the population and labor force, with reference to such matters as size, distribution, urbanization, mobility, characteristics, recent trends and future growth.

**Public Utilities**

Analysis of the Effect of Business Cycle Behavior upon Electric Utility Operations. New England Power Service Co., 1953.

Copies are not available.

Determination of the effect of

**Turn Page**

**As an important factor in the growth and development of New England into the highly important industrial territory it has become,**

## **THE NEW HAVEN RAILROAD**

**pledges its continued efforts to give to New England the finest possible transportation service.**

**The prosperity of The New Haven Railroad depends upon the prosperity of New England, just as New England's industrial future depends upon efficient transportation service.**

**We have an abiding faith that New England is striding forward towards an even greater future than its great industrial past.**

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MACHINES and tools for coordinated production from blank to finished gear... that is the Fellows Method. In capacities for cutting gears from 1/16" to 120 inches, Fellows machines tooled with Original Fellows Cutters provide unified responsibility—a great practical advantage in the control of cost and quality. Fellows Sales and Engineering Staffs are nearby at your service.

field, Vermont.  
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New York 1.



Studies

(Continued)

industrial depression in Lawrence, Massachusetts, on rate of growth of electric sales.

Industrial Electricity in Rhode Island, Rhode Island Development

Council, Research Division, 1952.

Evaluation of the State's electric utilities facilities in five parts as to reliability and cost (Part II) to determine their adaptability to industrial expansion and location. Includes specific data on the Narragansett Electric Company (Parts III and IV) and the Black-

stone Valley Gas and Electric Company (Part V).

Regional Planning

A Plan for the Industrial Development of Vermont. Vermont Development Commission, 1954.

Plan designed to provide a basis for industrial development of various areas in the state, including the steps which each of the homologous areas should take in making preparations for attracting industries.

Industrial Districts

Organized Industrial Districts—A Tool for Community Development, by Theodore K. Pasma. U. S. Department of Commerce, Office of Technical Services, Area Development Division.

Completion date: July, 1954. Copies will be available at cost of about \$1.00 from the U. S. Government Printing Office, Washington, D. C.

Practical guide for communities and others on the establishment of planned industrial districts based on a national survey by the U. S. Department of Commerce.

Transportation

Mileage Rate for Private Cars Used on Company Business. Survey Report No. 53-14. Worcester Country Metal Trades and Employers Association, 1953.

Brief tabulation of various rates paid by 60 companies to employees using 621 private cars for company business based on questionnaires.

Turn Page



# STEEL

## for New England Industry

Wetherell's experience supplies particular steel to New England Industry's particular and varied needs.

**TOOL STEELS**

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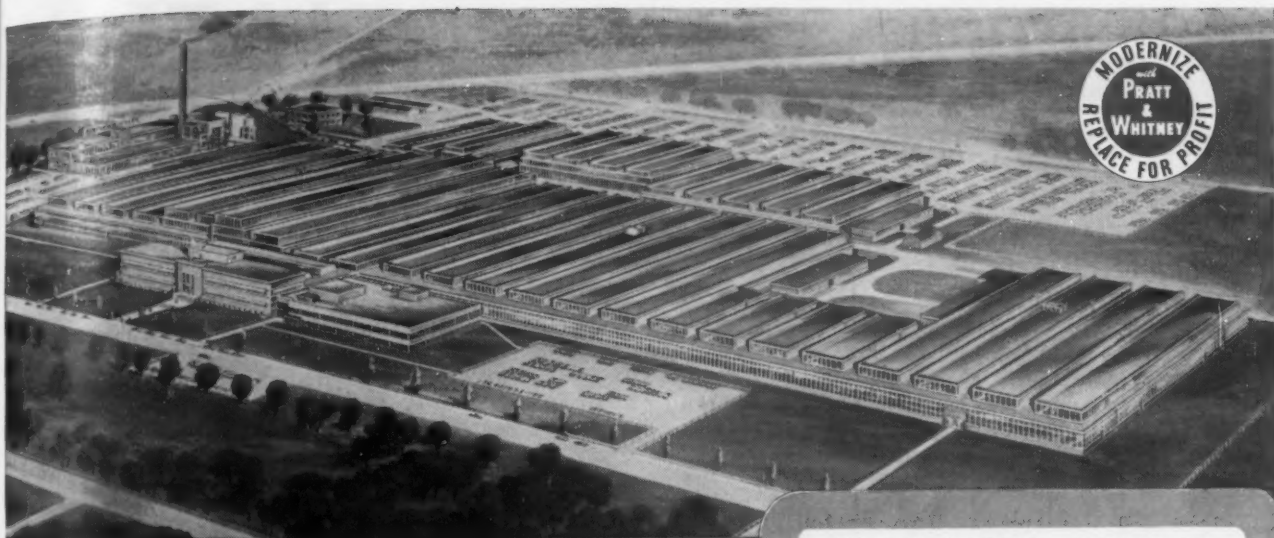
- ▶ Whole plates annealed and pickled to a clean, smooth surface.
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Air-O-Limit Comparators  
Electrolimit Comparators  
Continuous Gages and Controls  
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Plug and Ring Cylindrical Gages  
Taper Plug and Ring Gages  
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## Skilled Labor

Connecticut is a state of manufacturing know-how where one out of every two employed persons is engaged directly in industry. In fact, the 1950 U.S. Census shows that Connecticut has a greater percentage of skilled workers than any other state!



## Markets

Within a radius of 100 miles of Connecticut's geographic center is one of the richest and most concentrated consumer markets in the world with a population of 21,000,000.

Connecticut itself in 1953 had the highest average family buying income in the nation—\$6,730!



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Ideal living conditions and ideal industrial locations are conveniently close together in Connecticut. You and your family will enjoy suburban or country living, as well as Connecticut's famous recreational facilities, all within a few minutes drive from your business. These are but a few of the advantages which have influenced some of the greatest names in industry to select a Connecticut location.

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## AREA DEVELOPMENT DEPARTMENT

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AND POWER COMPANY

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HARTFORD 1, CONNECTICUT

## — Salute to N. E. —

## Economy:

Two year survey by N. E. Committee most extensive ever.

Most extensive survey of the economy of New England ever undertaken was by the National Planning Association's Committee of New England. Their work continued for more than 2 years. The complete work is expected to be published in sections sometime this fall.

Excerpts of the committee's work were released at a meeting sponsored by the Committee of New England, the New England Council and sections of the American Assn. for the Advancement of Science. Meeting was held in Boston, Dec. 28, 1953.

Title of the conference was "the economic state of New England." Following are highlights from that meeting:

### Things To Be Done

A New England economy that's sound but neither stronger nor weaker than the nation's is the basic finding of Dr. Leonard O. Carmichael, chairman of the Committee of New England.

Dr. Carmichael, who also is secretary of The Smithsonian Institution, Washington, gave an evaluation of the committee's report and of the opportunities that lie ahead for the region.

But while he declared the region's economy "sound," and he emphasized the point, he left no doubt there were things to be done—and he tied New England's fortunes closely to those of the nation.

"None of our studies reveal any source of strength which would push New England into a pre-eminent position in the national economy," Dr. Carmichael said.

"None of our studies revealed any fundamental weakness large enough to pull the whole regional economy down to disaster levels during a period when the national economy continued to flourish."

He said New England's future

Turn to Page 193

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SYSTEMS TO YOUR  
OWN PRESCRIPTION  
for Vastly Increased  
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at Higher Temperatures

*What chemicals do you want to resist? At what temperature? You give us your requirements and we'll prescribe for them with the correct, best PLA-TANK formulation to solve your particular problem. We vary the formula to meet the need.*

It is literally possible for our technical service engineers to prescribe one of a number of vastly improved combinations of PLA-TANK material for liquid contact applications never before considered suitable for ordinary polyester plastics. These new materials are resistant to temperatures of 200° and over.

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PLA-TANK achieves these vastly improved resistances by carefully controlled variations in either the resin or fiber or both. Now more than ever "all polyesters are not alike" and commonly published studies of polyester performance must not be applied to PLA-TANK special materials.

Intensive research and testing covering thousands of samples have isolated and selected those alkyds which show highest chemical resistance to various specific agents and matched them with the most effective cross links.

NOW . . . you, in the chemical industry, can "prescribe" new PLA-TANK for your own specific needs, knowing your tanks and duct systems will have increased usefulness and longer life. Benefit from continuous research and development with PLA-TANK—first name in chemical resistant laminates.

**WRITE TODAY —** mentioning your requirements, for complete data sheets on new PLA-TANK material.

P-19

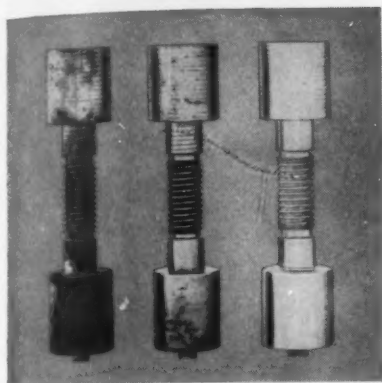
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### vpi WRAP

Paper coated with a  
Volatile Corrosion Inhibitor

Look at these steel samples—they tell the story. After 3 years of unsheltered storage outdoors in an industrial marine atmosphere, only the VPI wrapped sample on the right is still bright and clean. The untreated sample on the left was wrapped in plain kraft, the middle one treated with a good rust-preventive oil and wrapped in Grade A barrier material. All were over-wrapped with kraft-asphalt paper.

A special coating on the VPI paper vaporizes . . . forms an invisible protective film that positively prevents rust.

Marvellum VPI is easy to use . . . just fold the paper over the part. No need for time-consuming slushing or greasing. No mess or costly cleaning when the item is unwrapped. It's bright and clean, ready for immediate use.

You'll find many uses for Marvellum VPI in your plant . . . wrap steel parts, protect inventories, line tote boxes.

Marvellum VPI is available in rolls of 20, 30, 40 and 60 lb. paper stock and can be individually imprinted with your trademark on quantity orders. Envelopes, sheets, bags, shrouds and tubes are also available.

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## — Salute to N. E. —

Economy

(Continued)

economic prosperity "is inextricably linked with our industry's ability to adopt new techniques and new products."

Some Yankee industries, Dr. Carmichael said, have been successful chiefly because they are able to do something better than competitors elsewhere. The biggest disadvantage in other cases, he added, is an outmoded process or product.

He described the region's need to add 15,000 new manufacturing jobs annually during the next few years if manufacturing activity is to grow at the same rate as the past 10 years.

He pointed to "a fundamental change in the competitive position of New England's manufacturers"—a general transition to a metals-based economy.

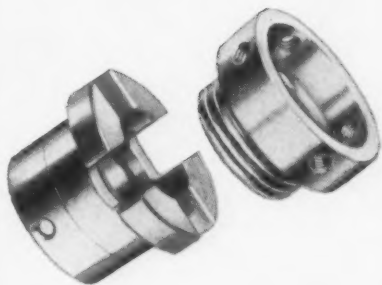
He said the first logical step in reducing competitive handicaps is to emphasize the maximum use of the natural and human resources the region has.

Dr. Carmichael said great strides can be made in achieving the goal of preserving and strengthening the vitality of present industries and acquiring new strength through new activities "if we maximize our utilization of natural and human resources, if we capitalize on the importation of foreign material, if we upgrade our manufacturing products, and if we achieve flexibility and research-mindedness in our organizations."

Turn to Page 196



"I got the idea for this model from the instrument panel of a new jet."



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Made to your specifications  
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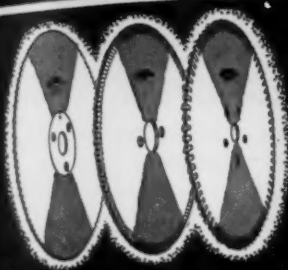
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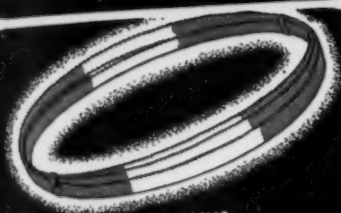
DETROIT, MICHIGAN

Here's a "Short"  
of **SIMONDS**  
Metal-Cutting Line



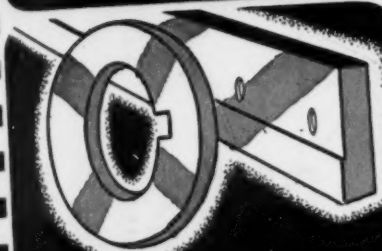
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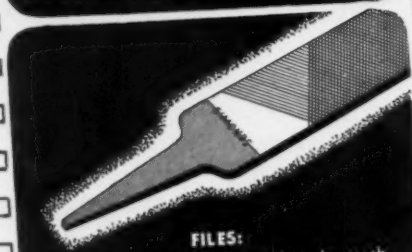
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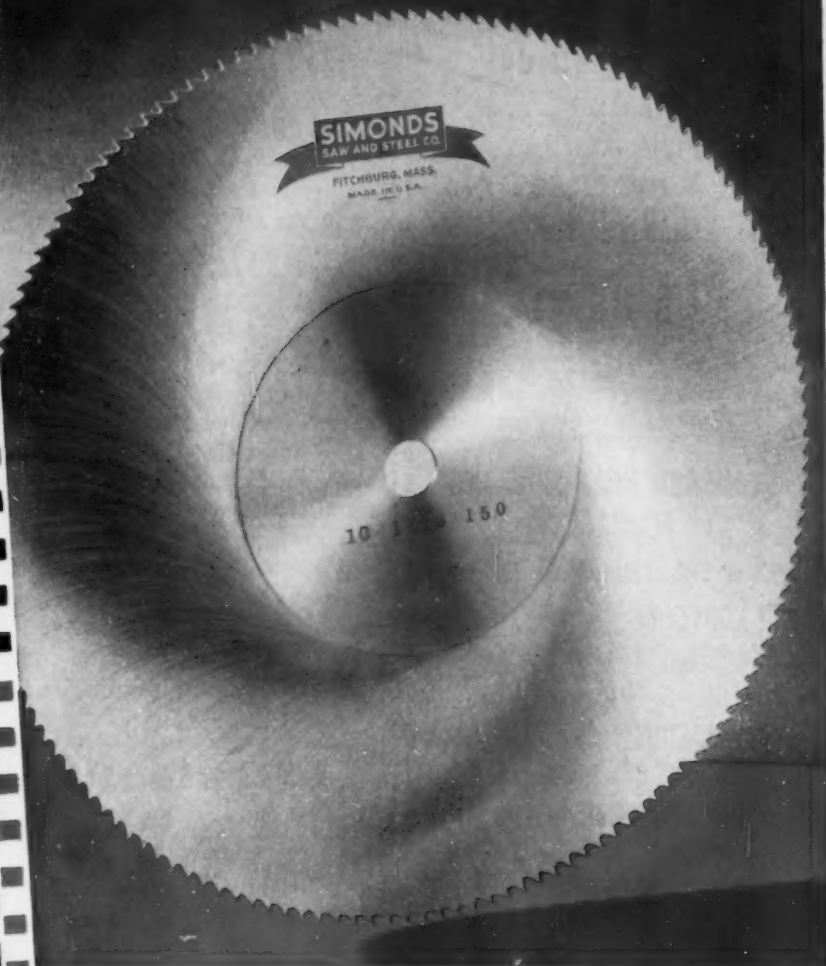


**FILES:**

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## Salute to N. E.

### Economy

(Continued)

He said there is one other element, "also critical". He termed it the atmosphere and climate for industrial growth in the region and added:

"Welcome in place of rebuff, encouragement in place of obstacles, zoning for rather than zoning against and equitable rather than penalty taxes are all essential if we are to build our future on the strength of our industry."

Attainment of New England's economic goals, he said, depends upon the effectiveness with which the region's natural and human resources are employed by its many organizations and associations.

And cooperative action in voluntary association, he added, always has been a major asset of the New England economy.

He said that one of the most important goals for the entire region is to "have our businessmen focus their attention on making their own individual businesses operate better, by adapting policies, techniques, and operations to changing conditions."

## Transition:

Ellis calls for upgrading of  
employment in N. E.

George H. Ellis, research director for the Committee of New England, said "Actions elsewhere may help or hinder, but the main drive for New England's economic advancement must be supplied here at home."

Dr. Ellis, who is also research director for the Federal Reserve Bank of Boston, said New England can no longer expect to make large income gains by shifting its workers from farming to manufacturing.

Unless there is a sharp increase in net in-migration, he said, about 15,000 workers a year may be expected to join the region's manufacturing labor force.

"This expectation sets a minimum goal for New England. We

must provide steady employment at good wages for our present workers. We must provide at least 15,000 new manufacturing jobs a year. And we must provide an ever-increasing flow of individuals' income."

The opportunity, he said, "must lie in upgrading present employment."

And he listed three ways to upgrade:

(1) Shift workers from one industry to another which has a higher value of output per worker, such as from textiles to the aircraft industries.

(2) Shift the product emphasis within an industry "as we have done by shifting from cotton gray cloth to cotton specialties."

(3) Use improved management, more machinery and new procedures to improve worker output.

Discussing the 18 topical reports which make up the Committee of New England study of "The Econ-

Turn Page

ask

## SESSIONS

HOW

STAMPED  
ASSEMBLIES  
SAVE TIME & MONEY

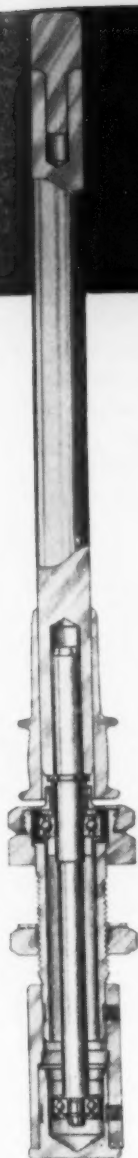
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At 10,000 rpm this completionneered spindle has .002 inch runout at its tip which is 12" outboard to the nearest bearing. It is made in a "factory within our factory."



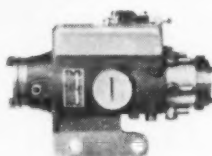
Braze assembled of one steel that hardens in a salt bath and one that does not, tested by 5000 pound push against cap, hardened and ground. A completionneered sub assembly.



Seventeen dimensions are inspected on this completionneered part.



Completionneering is also economical for short production runs and for coarse tolerances.



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AMS.	CORRESPONDING CODE NUMBER
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5645	03916 T
5646	03919 T
5648	03935 T
5616	07912 T
5721	07925 T
5700	07245 T
STAINLESS GREEK ASCOLOY	316 INCONEL
	321 ALUMEL
	347 CHROMEL

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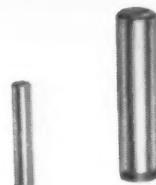
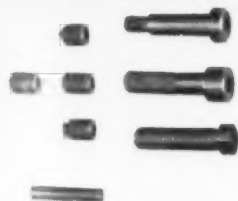
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## — Salute to N. E. —

omic State of New England," Dr. Ellis said:

"New England's economic future will be determined by the effectiveness with which our natural and human resources are utilized by our organizations."

This conviction, he said, is the economic concept which ties together the 18 reports.

Said Dr. Ellis:

"There are two major types of economic transition currently under way in New England. The first relates to the changing occupations of the New England labor force. The second type relates the changes within the manufacturing sector of the New England economy."

New England had already reached a stage of advanced economic development by 1910, when only 10 per cent of its civilian labor force was engaged in farming, forestry or fishing activities, he said, adding:

"To preserve the 1910 relationships between farming, manufacturing, and service categories of

the labor force, our total New England labor force would have had to expand by 373,000 workers more than it actually did during that period.

"This would have required the net in-migration of at least 675,000 persons.

"Those who complain that New England did not expand its manufacturing employment as fast as the nation are in effect complaining that in-migration has not been high enough."

He said "we can no longer expect the large gains in income that result from shifting our workers from primary to manufacturing occupations. We have made that shift in the past."

In the future, he said, New England must look within the category of manufacturing employment for the changes necessary to provide higher income.

Dr. Ellis described the transition in New England manufacturing as "an increase in the relative importance of metal-working and metal-using industries."

## People:

**Greatest resource makes up for lack of raw materials.**

People are New England's greatest resource, and the unusual qualities of Yankee workers have made up in large part for the region's lack of raw materials and fuels, according to Dr. Arthur A. Hauck, president of the University of Maine.

New England is primarily a manufacturing center because of this human resource situation, said Dr. Hauck, and it is on manufacturing that the whole level of prosperity and economic activity depends.

New Englanders must therefore be ever on the alert to maintain the region's strong competitive position in industry," he added.

This is essential "if jobs are to continue to be available for the region's labor force—a force which numbered almost 3.8 persons in the most recent census."

*Turn Page*

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MAINE DEVELOPMENT COMMISSION State House, Augusta 9, Maine



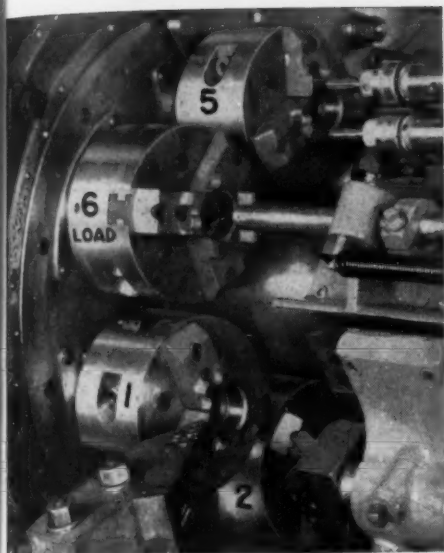
ASK

# BAIRD

ABOUT IT!

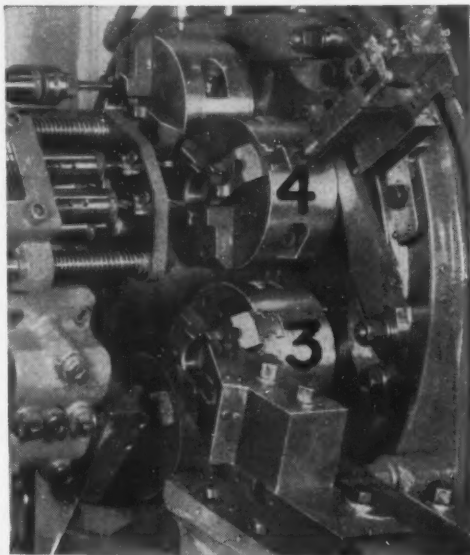
## HIGH PRODUCTION TOOLING

### A BAIRD CASE HISTORY



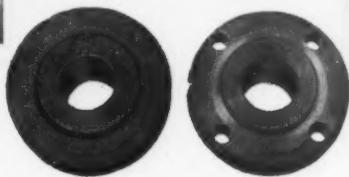
View of machine from front.

- 1 Finish turn flange O.D. (3.44"). Rough turn hub dia. Rough face flange and hub.
- 2 Chamfer I.D. Chamfer flange dia. and hub.
- 3 Finish turn hub, finish face flange and hub.
- 4 Drill and c'sink 4 holes — 23/64" dia. drill x 29/64" dia. C'sink, sub land drills. (Work held stationary when drilling.)
- 5 Tap 4 holes 7/16" — 14NC — 3. (Work positioned, held stationary, lead screw operated.)
- 6 Unload and load.



View of machine from rear.

The part . . .  
before and after machining.



### PRODUCTION

Cycle time 23.12 seconds per piece.  
Gross production 155 pieces per hour.

### FINISHING A CAST IRON PULLEY HUB...

Here's another example of the way a single Baird High Production Machine can be tooled to handle a series of operations ordinarily not considered practical on a single spindle automatic unit. Note that, in addition to the usual concentric operations being performed on this hub, we are drilling, countersinking, and tapping accurately located bolt holes in the hub flange at just two stations in the cycle and at a very satisfactory production rate for the whole operation. Photographs show the tooling and relative simplicity of the set-up.

And, as in the case of all Baird No. 76 Chucker installations, this one is conspicuous for smoothness and dependability of everyday performance. Automatic chucking frees operator's hands for efficient, easy feeding. Automatic safeguards prevent damage to work, machine, or injury to operator in case of incorrect loading. Spindle speeds are independently adjusted to best performance of the individual operation.

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Labor costs are one of the basic factors affecting New England's competitive position, Dr. Hauck continued, and the picture here on both wage rates and productivity look good.

"Industrial wages in New England on the average appear to be quite close to national figures, and the efficiency of Yankee workers is at least as great and in many cases greater than that of workers elsewhere," he said.

The condition we should strive to attain, he said, "is to increase productivity even further to make higher wages possible for New England workers—with no increase in labor costs for manufacturers."

Workers' productivity ties in closely with the state of relations between management and labor, according to Dr. Hauck. "Fortunately, the present state of labor-management relations in New England," he concluded, "is a good one. This is indicated by our low strike record.

## Transport:

**Freight rates will count heavily in future development.**

The administration of freight rates will count heavily in the future development of New England's economy, according to Robert M. Edgar, vice-president of the Boston and Maine Railroad.

Higher costs and shorter hauls are the bane of the region's transport operators, he said. And he emphasized that New Englanders should not expect favored treatment on freight rates, although they certainly have every right to expect equitable treatment.

The Boston and Maine official stressed railroad rates, since New England's most important commodity trade with other areas is by rail.

But overall, he said, the region's ability to compete depends on the cost of bringing raw materials to

Yankee mills and factories and returning the finished products to market. And that goes for all modes of transportation, he added.

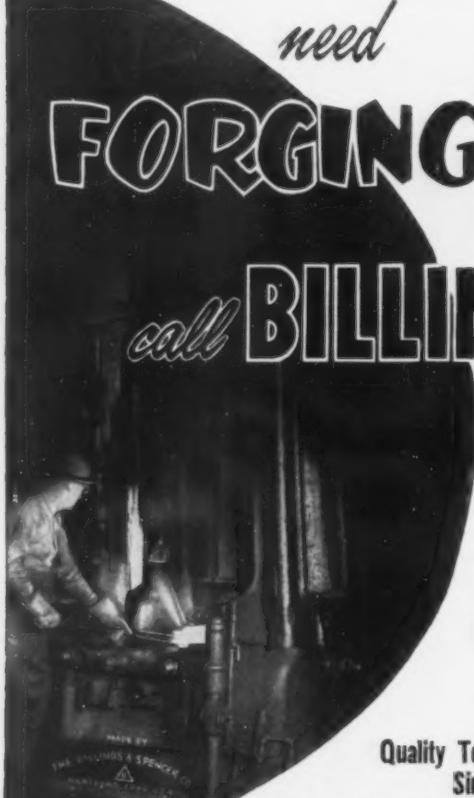
He also referred to the effects of the St. Lawrence Seaway on the region's ports and said Port of Boston estimates indicate that the Seaway may divert as much as 30 per cent of the foreign traffic which now passes through Boston.

He said the average revenue per ton mile for the New England railroads runs higher than the national average, reflecting a slightly higher rate scale and shorter hauls. The principal problems of the New England railroads, he added, are costs, competition, regulation and passenger service losses.

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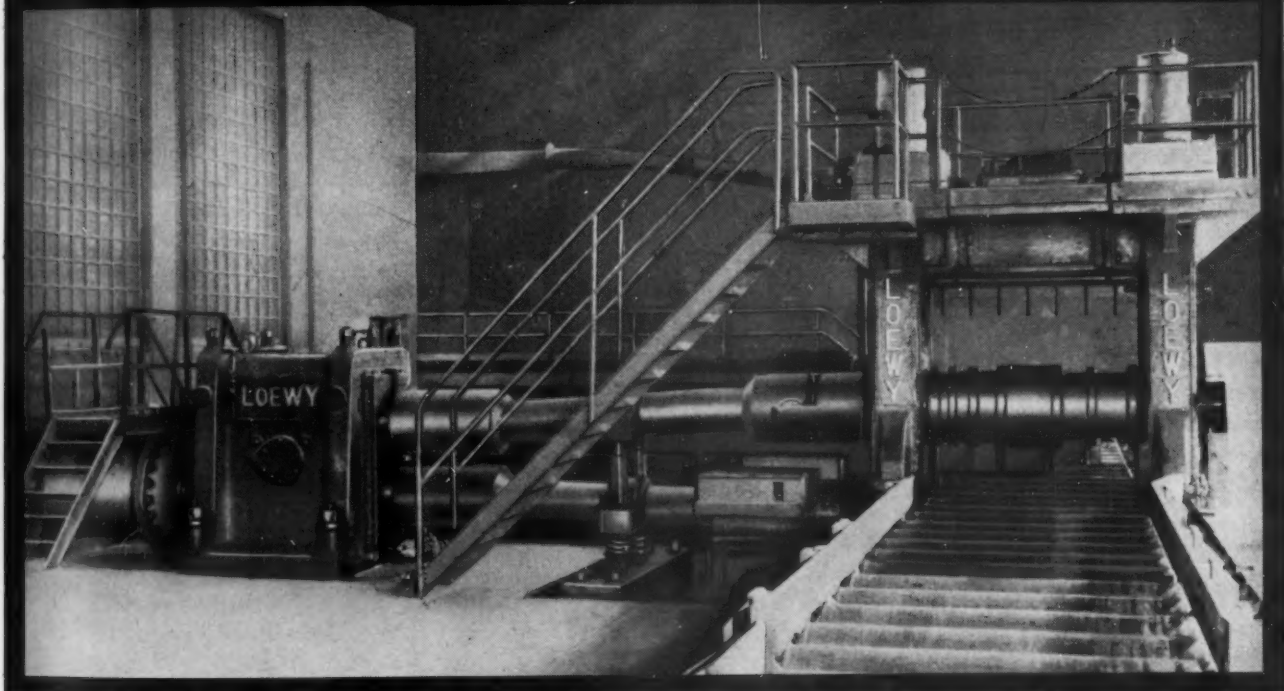
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## Technical Briefs

Engineer

### Assembly:

**Preload indicating washers extend life of assembly bolts.**

A new washer that makes possible more accurate preloading of bolts used in aircraft assembly has been developed and placed in use by the Douglas Aircraft Co.

Exhaustive tests with the washer showed that it can be designed to assure an average tension preload of 80 pct of the desired bolt preload with slight deviations. This will result in a sharp increase in the fatigue life of the bolts and tighter assemblies, Douglas engineers stated.

#### Eliminates Torque Wrench

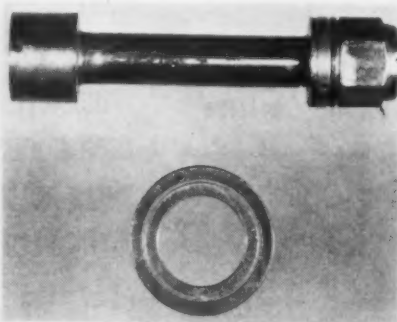
The washers are now being used on the Douglas DC-6 and DC-7 series transports to join the lower half of the nose section to the fuselage, to join wing and fuselage, and for inner and outer wing attachment.

The new device, called a preload indicating or "PLI" washer, eliminates the need for torque wrenches. It consists of two concentric steel rings. The inner ring, which is thicker than the outer ring, takes the load when the nut is tightened, allowing the outer ring to move freely.

#### Load Can Be Controlled

Continued tightening of the nut compresses the inner ring until the rings bind. When the outer ring can no longer be moved, the desired preload has been reached.

The load at which the bind oc-



Washer gives loading . . .

### IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 140. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

curs can be controlled by choice of washer dimensions and the washer material.

During the tightening operation the operator "wiggles" the outer ring by means of a disposable handle. This handle may be straight or especially shaped for easy access purposes.

#### Reduces Breakage

The conventional method of controlling the preload in bolts and screws is the "torque wrench" technique which produces inconsistent preloads in the fastener.

It was not unusual to find the preload tensions scattered from 20 to 80 pct of the bolt yield strength as a result of normal variations in the dimensions of bolt and nut, the presence of lubricant, contamination, corrosion, and the type of plating.

Because of these variations, Douglas engineers found it necessary to specify a low torque with the torque wrench technique to avoid frequent over-tightening and breakage.

#### Will Be Licensed

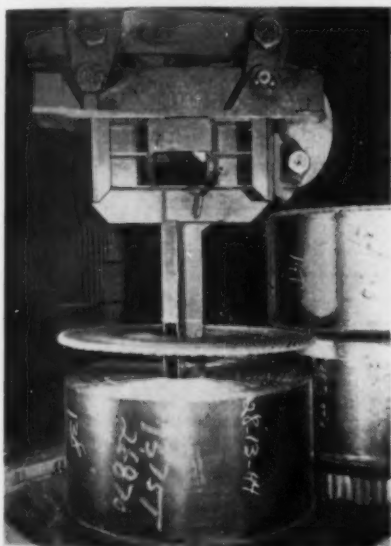
Although originally designed for aircraft assembly work, the new washer can be used advantageously wherever accurate preloading of bolts is required. Douglas plans to make the washers available to industry as soon as licensing arrangements are completed.

With the device, the thicker inner ring takes the load when the nut is tightened. When the outer ring can no longer be moved the desired preload has been reached.

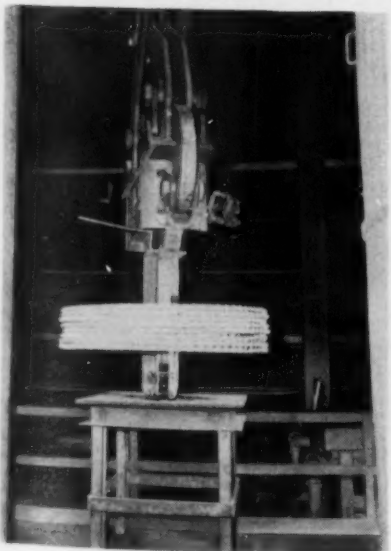
## Materials Handling:

**Spacer tongs save handling time, add to safety.**

Specially designed spacer tongs not only save considerable time but make handling operations safer in the tin mill annealing department of Weirton Steel Co., Weirton, W. Va. In lifting and positioning convection spacers, the spacer tongs are themselves picked up automatically by coil tongs suspended from an overhead crane. Thus the crane can shift quickly from lifting coils to lifting the spacers used during the annealing.



**Sets down one spacer . . .**



**. . . Or many, with ease**

*Turn Page*

## thumbs down on high handling costs

A Conco Crane, custom-designed for a specific application, can cut costs sharply. A modest crane investment can return important profits. Let a Conco engineer show you how.

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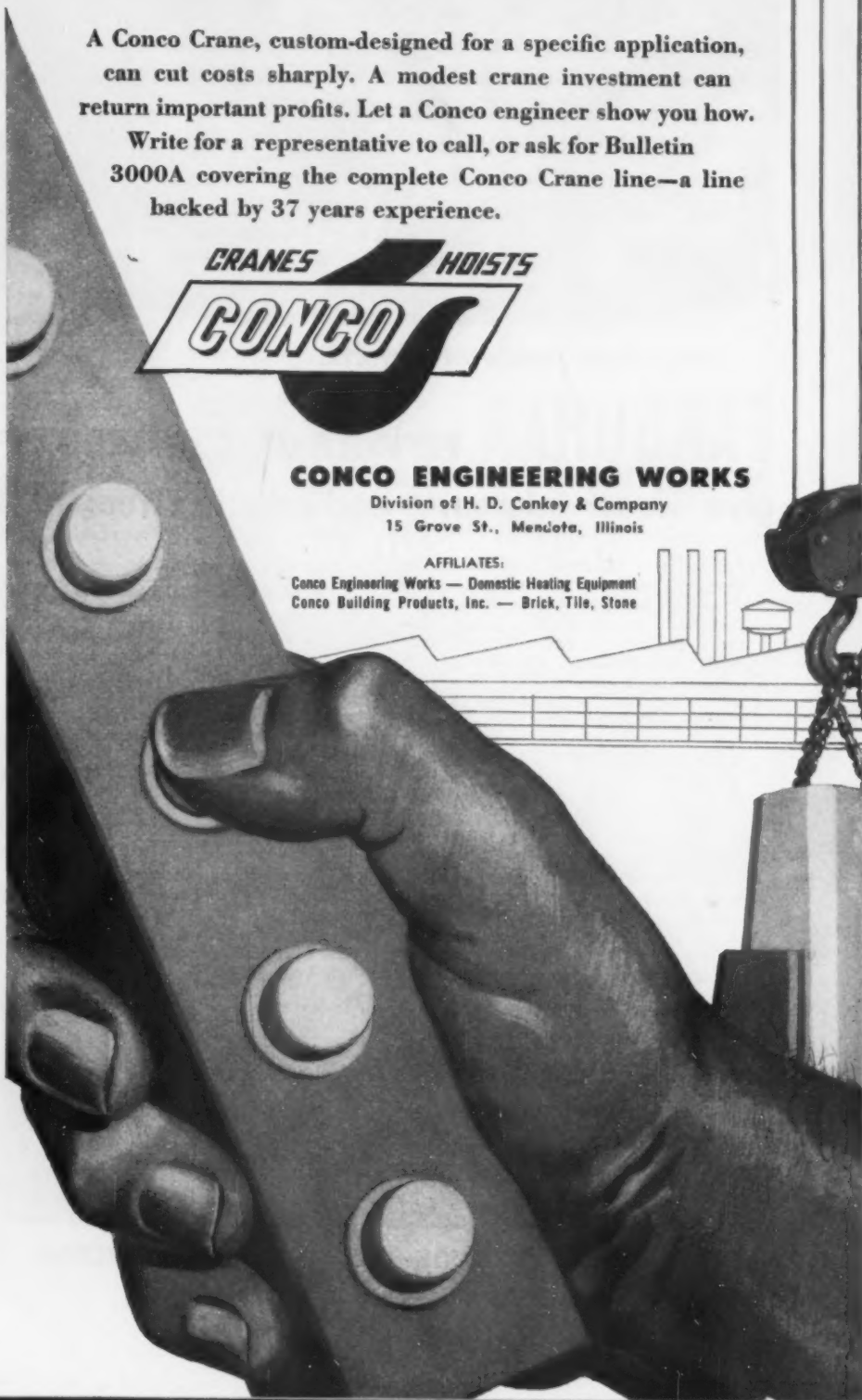


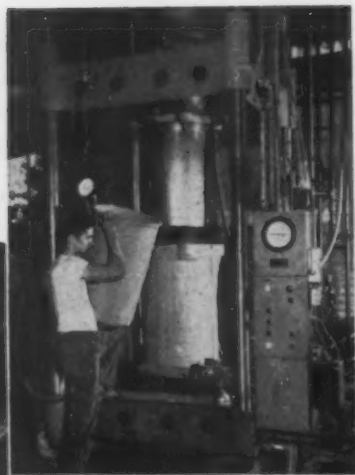
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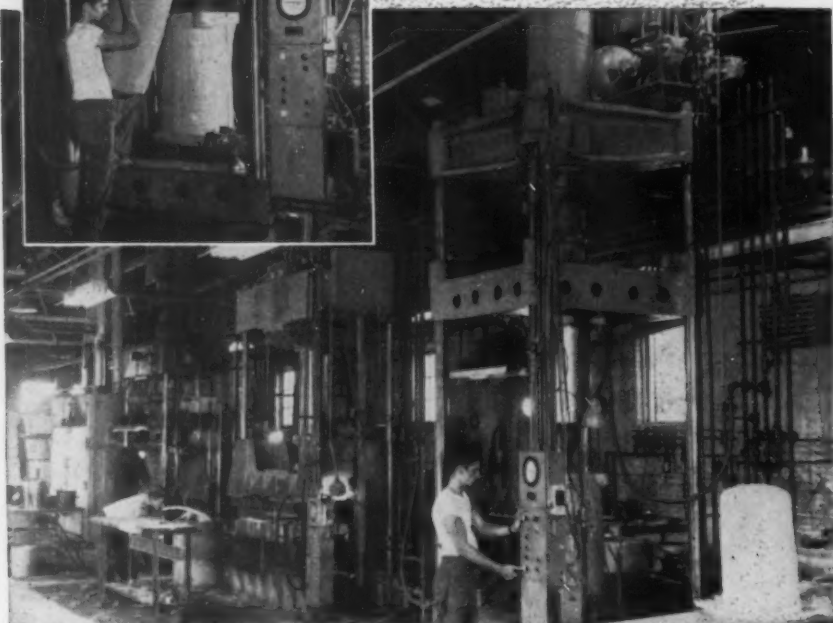
Conco Engineering Works — Domestic Heating Equipment  
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Finished mold for electronic housing being removed from 100-ton press.

Over-all view of 80-ton, 40-ton and 100-ton Farquhar Hydraulic Presses at American Insulator Corporation, New Freedom, Pa.



American Insulator reports:

## FARQUHAR HYDRAULIC PRESSES

give "closer tolerances and greater strength"\*

\*A battery of Farquhar Hydraulic Presses currently in operation at American Insulator Corp., New Freedom, Pa., was selected originally because the presses had to be custom-made, and Farquhar was in the best position to do this. In addition to this advantage, the Farquhar Presses have now proved to be more economical in operation and capable of maintaining closer tolerances due to greater rigidity of platens. So reports Mr. W. F. Remphrey, foreman of American Insulator's reinforced plastics division.

Three presses (40-, 80- and 100-ton) are used for molding fibre glass for production of classified electronic housings. The same job that formerly required an hour to mold through a vacuum process now takes only 6 minutes on a Farquhar Press! The hydraulic presses feature an automatic

cycle, with one-man loading.

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The above installation is just one more example of Farquhar performance in heavy production! Farquhar Presses are built-for-the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of extra long guides on the moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

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### —Technical Briefs—

Convection spacers are the ribbed steel disks used in strip mills to separate coils during annealing. Their ribbed design helps distribute heat around the coils, insuring proper annealing.

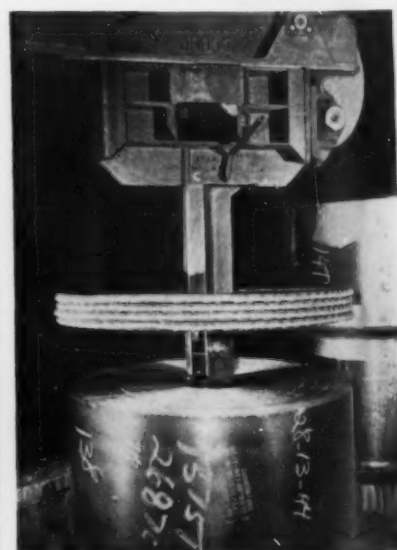
Coils are tiered four or five high with a spacer separating each coil. A cylindrical metal cover over the entire stack of coils forms a furnace through which heat is circulated.

Normally, four annealing furnaces are loaded at a time. Previously, after each tier of coils was put in place, the coil tongs were removed from the crane hook and replaced with a triple chain to lift the spacers. This was repeated for each tier of coils until all four furnaces were loaded. After the coils were annealed, the same operations were repeated in reverse.

### Spacer Tongs Do Three Jobs

The spacer tongs consist of a three-legged mandrel with a centering guide that is easily lowered into the inner diameter of a convection spacer, or a pile of spacers.

A ratchet device, controlled with a three-position lever, permits three different operations. In one position, the tongs will deposit spacers on coils one at a time. In a second position, they will pick up spacers one at a time up to 12 spacers. In the third position, they will discharge an entire load of spacers.



Picks up coil spacers . . .

Turn Page



**Capacity GRABS**



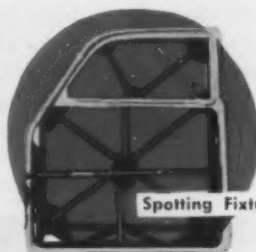
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**REPORT**

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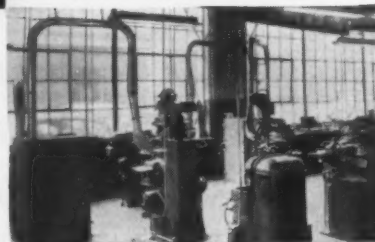
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see our catalog in



## Technical Briefs

In operation, the coil tongs first position the coils that form the lower tier. Then the coil tongs pick up the spacer tongs, which, in turn, pick up a load of spacers. After a spacer is put above each coil, the spacer tongs are returned to the storage rack, and the coil tongs put the second tier of coils in position. Again the spacer tongs are picked up to position the spac-

ers. This is repeated until all the coils and spacers are placed.

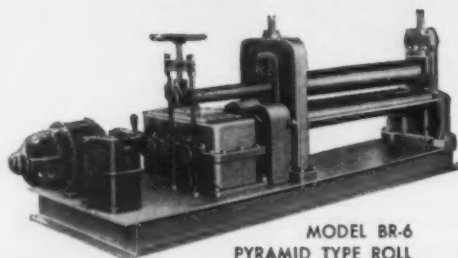
The spacer tongs operate automatically except for setting the position lever. Once they pick up a spacer, the tongs will not let go until it is safely positioned on a coil or delivered to the storage rack. Tong operation is controlled by the crane man. Workmen on the floor serve only as signalmen.

# WEBB

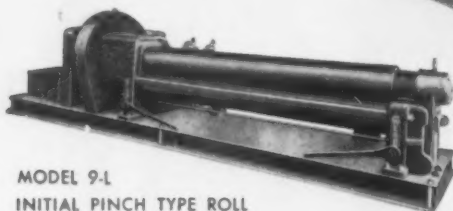
## PLATE FABRICATING MACHINERY

### PLATE BENDING ROLLS

The Webb Corporation offers a complete line of Plate Bending Rolls for the rolling of the thinnest plate up to plate 2½" thick. Offered in a variety of lengths and thicknesses. Constructed for the modern fabricating shop.



MODEL BR-6  
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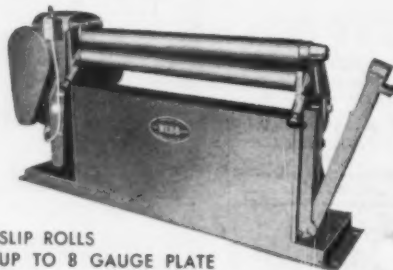


MODEL 9-L  
INITIAL PINCH TYPE ROLL

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A complete line of small Sheet Metal Forming Rolls are also available. All power-driven with shaft sizes 3" to 5" for the handling of the thinnest gauge material, up to 8 gauge material. Special rolls for the forming of polished sheets, aluminum and stainless steels can be furnished. Complete catalogues on any size machine furnished upon request; write Dept. E.



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INITIAL TYPE ROLL



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# WEBB CORP.

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## Heat Treating:

**Continuous normalizing lines speed output of pipe.**

Installation of a new continuous "in line" heat transfer process which normalizes oil and gas-carrying welded steel pipe in 66 seconds has been completed at Lone Star Steel Co. plant at Lone Star, Texas. "Normalizing" is, in this instance, the heat treating of the linear welded seam of a pipe to make the seam homogeneous with the rest of the pipe.

Two lines of Selas gradient, gas-fired furnaces, each with 33 barrel-type units, are now operating in the "oil country pipe division" at the Lone Star plant.

### Refines Grain Structure

The normalizing equipment produces pipe of exceptionally fine grain, capable of withstanding the great pressures of cross-country natural gas and oil pipe lines.

One furnace line meets specifications calling for a rated maximum production of 1500 lb per minute, with speeds through the furnace to pace the welding speed of 50 to 150 ft of pipe per minute. The other line requires a maximum normalizing production rate of 3000 lb per minute, with forward speeds through the furnace up to 120 ft per welding minute.

The "continuous" heat-transfer line, said Hess, occupies only 2805 sq ft of floor space, against the much larger area which conventional normalizing furnaces would have required.

## Plating:

**Nickel sulfamate bath shortens plating time.**

Nickel sulfamate baths plate fast and are commonly used to apply heavy coatings in electroforming, electrotyping and resizing operations. Now a new nickel sulfamate bath, developed by Hanson-Van Winkle-Munning Co., Matawan, N. J., plates 75 pct faster, is more

## Plate deposition rate can be increased . . .

versatile, easy to control and produces harder deposits with less brittleness.

The new bath plates up to 0.007 in. per hr compared to 0.004 in. per hr with present baths. Operation at current densities of 140 amp per sq ft make this high speed possible. Plating with conventional baths is done at current densities as high as of 80 amp per sq ft.

With this process, deposits of low internal stress are easily obtained, and a wide range of specific compressive and tensile stresses are also possible. Compressive stresses from zero to  $-9 \times 10^3$  psi and tensile stresses from zero to  $18 \times 10^3$  psi may be obtained by varying current density, temperature and concentration of the addition agent used in the bath.

The bath is made up of nickel sulfamate, nickel chloride, boric acid and an addition agent. Pitting is no problem with this bath and solutions do not require a wetting agent. Purity of the new bath is higher, and complete analysis of all constituents is possible.

As an example of the hardness obtainable without abnormal brittleness, electrotype plates prepared in the new bath have lasted 50 pct longer in smooth-stock printing and about 35 pct longer in carton printing than conventionally-coated plates.

### Not Sensitive to Impurities

Composition of the new bath is 36 to 44 oz per gal nickel sulfamate, 4 to 6 oz per gal nickel chloride, 4 to 6 oz per gal boric acid, and 0.5 to 1.5 oz per gal SN-1 addition agent. Its pH is 3.5 to 4.2 and nickel content 10 oz per gal. Operating temperatures vary from 75 to 140°F and current densities from 20 to 140 amp per sq ft.

Like conventional baths, this bath has high conductivity and excellent anode corrosion. Anode and cathode efficiencies are in close balance making for stable composition for long periods. The bath is not sensitive either to organic or metallic impurities.

## Forming:

### Cold-heading eliminates 89 pct of scrap loss.

Two things were accomplished when a large appliance manufacturer switched to cold-heading for making pushbuttons. It saved \$22,000 annually and eliminated 89 pct of the scrap loss of previous machining operations.

The use of 31/23-in. bar stock had been required for turning it down to an 0.248-in. diam for most of its length, with a short section reduced to 0.125 in. Upon recommendations of engineers of Camcar Screw & Mfg. Corp., Rockford, Ill., the firm converted to cold-heading. The piece can now be made from 1/8-in. diam wire to exact tolerances and with a more satisfactory grain structure and with less waste metal.

# COWLES INTRODUCES

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## —Technical Briefs—

### Spinning:

**New lathe for large parts  
has 180 in. swing diam.**

A giant metal spinning lathe of 180 in. swing diam is now in service to meet increasing industrial demands for larger and heavier spun metal parts.

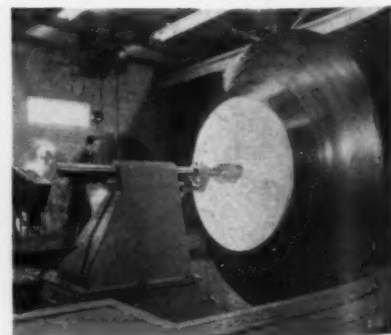
The huge horizontal spindle lathe was designed and built by Phoenixspun Div. of the Phoenix Products Co., Milwaukee, Wis., for use in their own plant. It is especially suited to the production of large spun shapes for atomic energy and industrial air-conditioning equipment.

#### Electrically Controlled

Because of the projected lathe size, special studies were necessary to determine horsepower-pressure requirements for spinning such tough metals as stainless steels, cupro-nickel alloys and titanium alloys.

Entire operation of the lathe is electrically controlled from a portable panel. This panel controls the speed of the 50-hp drive (from zero rpm on up), clutches, brakes, and all movement of the tail stock. Spinning tools are hydraulically actuated and pressures for hot spinning can be built up to extremely high levels.

Before this 180-in. giant lathe was built, the industry generally has not been able to spin shapes over 104-in. Even then welded sheets had to be used since sheet metals are normally only available in 72 in. and 85 in. widths. Welds must have 100 pct penetration and be ductile.



**Spins larger forms . . .**  
Turn Page

Case No. 106

Thomas Strip Div. Reports:

- Improved Atmos Gas Supply
- Increased Production
- Higher Quality Product



## Twin Kemp Atmos Gas Generators Give This Steel Producer Absolute Atmosphere Control

Preventing oxidation and discoloration during the annealing of cold strip steel is the assignment of two Kemp Model 6-MR Atmos Gas Generators installed at Thomas Strip Division of Pittsburgh Steel. The picture shows Fred Michaels, Turn Foreman, observing the test burner on the panel of the controlled atmosphere producer.

Fueled with natural gas, these units supply uniform atmospheric gas within the annealing furnaces . . . deliver exact qualitative analysis regardless of load demand. Delivering up to 6,000 cfh, the battery of Kemp Generators assures protection against oxidation and discoloring of steel in process.

### Kemp Units "Do Far Better Job"

Division management states that the Kemp Generators are doing a far better job than the generating equipment

they replaced. Purity of the gas is very good by actual analysis . . . equipment capacity increased . . . maintenance and labor costs reduced . . . product quality improved by the much closer atmospheric control made possible by Kemp.

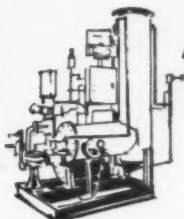
### Kemp Can Help You

If you have a controlled atmosphere problem, Kemp can help you. Every Kemp Atmos Generator is engineered for fast-starting, easy operation . . . delivers a chemically-clean, controlled atmosphere at specific analysis, without fluctuations regardless of demand. For convenience, safety, and dependability—specify KEMP. A Kemp engineer will gladly discuss your own specific problem without obligation.

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OF BALTIMORE



## ATMOS GAS GENERATORS

ADSORPTIVE DRYERS • SINGEING EQUIPMENT  
IMMERSION MELTING POTS  
CARBURETORS • BURNERS • FIRE CHECKS

## Molding:

### Process for precoating sand speeds shell molding.

Savings up to 50 pct in resin content for shell molding can be obtained with a process for precoating sand with phenolic resins. This new process, developed by Bakelite Co. Div. of Union Carbide and Carbon Corp., provides for higher green strength, greater shell mold bond strength, and smoother casting surfaces.

The coated sand forms a thin film of resin around each sand particle prior to forming the shells, resulting in a faster melt, faster flow and faster bond than previous resin-sand mixtures.

### Shortens Production Cycles

Because this phenolic resin is stable and nonreactive to heat, it coats the sand in a molten state without hardening prior to the production heating cycle. A catalyst in aqueous solution added af-

ter the sand is coated brings about the reaction which hardens the resin to bond the sand layer in the shape of a casting mold.

Shorter production cycles result from the faster curing time and the 25-pct reduction in dwell time of the precoating process. Even though less resin is used, comparable or better strengths can be obtained in shell molds and cores.

This material also eliminates segregation, increases production efficiency, and yields better castings without pitting or bubbles. Its use increases shell mold permeability and eliminates resin migration to the pattern surface resulting in more accurate and sounder castings that require less metal and less machine finishing.

## Inspection:

### Powerful X-ray unit weighs only 10 lb.

A small X-ray unit, weighing only 10 lb, emits rays comparable in energy to a 100,000-v X-ray machine. Its active component is a tiny particle of thulium which has been made radioactive in a heavy water nuclear reactor. Total cost of the first model, which was developed at Argonne National Laboratory was \$40 exclusive of irradiation charges.

### Simple, Inexpensive, Portable

The active component thulium is one of the rare elements which to date has been used little for practical applications. It is mounted in a source holder and shield equipped with a shutter mechanism operated by a standard photographic cable release. The unit may be the answer to the need for simple, inexpensive and portable X-ray photography.

The unit requires no electrical power supply. Excellent rare earth separation facilities and powerful reactors made it possible to develop such an instrument using radioactive thulium. At present, it is under test as an industrial inspection tool and as a diagnostic field unit for medical purposes.

## New Books:

### Techniques of supervision, outlooks, attitudes reviewed.

"*Techniques of Supervision*," by A. R. Lateiner in collaboration with I. E. Levine. Text describes the attitudes and outlooks that modern supervision requires. Author gives clear-cut techniques which will help supervisor tend to human relations while setting the pace on production. Techniques may be referred to over and over again as guides in solution of specific kinds of problems. Other topics discussed include accident control, simplification of work methods, training employees and discipline. Self appraisal check list at end of book gives better awareness of methods; determines change needs. National Foremen's Institute, Inc., Arthur C. Croft Publications, 100 Garfield Ave., New London, Conn. Cloth edition, \$4.00; paper edition, \$2.00. 208 p.

"*Metal Cutting Tool Handbook*." Revised edition of handbook presents latest data on Twist Drills, Reamers, Counterbores, Taps, Dies, Milling Cutters, Hobs, Gear Shaper Cutters, Gear Shaving Cutters and Broaches. In each section there is information on the design, proper application and the maintenance procedures of the tools described. Tables of dimensions and tolerances of standard sizes of tools are included. Metal Cutting Tool Institute, 405 Lexington Ave., New York 17. \$7.50. 690 p.

"*Fundamentals of the Working of Metals*," by G. Sachs. Various chapters present an elementary description of the basic phenomena which determine the performance of metallic materials on mechanical working. They apply equally to the two large commercial fields where working, forming, or plastic deformations are used to arrive at the desired shape of a metallic product, its processing into simple shapes and the fabricating of these into more complex parts. Interscience Publishers, Inc., 250 Fifth Ave., New York 1. \$4.75. 158 p.

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## Machining:

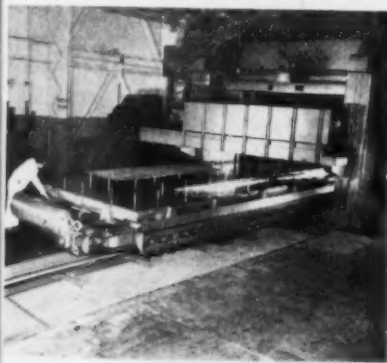
**Huge spar and skin mill shapes aluminum to close tolerances.**

Carving and shaping thick aluminum plates 40 ft long and 10 ft wide is now being done at surface speeds of 150 ipm at Douglas Aircraft Co., Inc., El Segundo, Cal., on a 250-ton spar and skin mill. The machine, built by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., is 90 ft long, 30 ft wide and 25 ft high, yet it is sensitive to tolerances of 0.0015 in.

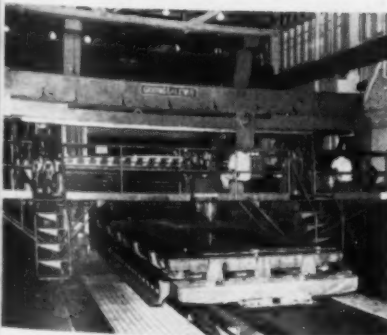
### Shapes Stronger Plane Parts

The machine is used to shape large self-reinforced wing and tail sections for jet combat planes. The sections are thinner and stronger than those previously made of hundreds of pierced and riveted parts. For example, in milling one wing section from 2-in. thick plate, 8 ft long by 4 ft wide, the number of parts was reduced from 29 to one, and 1300 rivets were eliminated.

An outstanding feature of the machine is one of its three cut-



Positioning of plate . . .



. . . Controlled from bridge

Turn Page

# THE ATLAS CAR & MFG. CO.

1140 IVANHOE ROAD  
CLEVELAND 10, OHIO



## KNOWN FOR DEPENDABILITY

### SCALE CAR 30-Ton Double Hopper Bottom

Car is equipped with very wide hopper with operator's platform above hopper to facilitate bin gate operation.





## BRAINARD WELDED TUBING

### *It has to be accurate*

● Since welded steel tubing is formed from flat strip, the wall thickness must be uniform throughout. This advantage is so well recognized that tolerances for wall eccentricity are not commonly included in specifications.

Brainard welded steel tubing is an economical structural material, and it offers many such physical advantages. Can it cut costs or reduce weight in *your* product designs? For complete information write Brainard Steel Division, Dept. O-6, Griswold Street, Warren, Ohio. An integrated producer; offices throughout the U. S.



## —Technical Briefs—

ting heads which is automatically guided by a template or pattern. The pattern directs the cutter through on intricate airframe section at speeds as high as 7200 rpm.

### Cutting Fluid Removes Chips

Work is placed on a 40-ft welded steel table which moves on rails at a speed of 150 ipm. Two men control the operation from a bridge or catwalk over the table.

The mill has 12 drive motors totaling about 350 hp. Also, 18 other motors and generators deliver the power supply.

Metal chips formed by the three cutting heads, are carried away at a rate of 900 cu in per min by a heavy flow of cutting fluid along either side of the work table.

## Research:

### Use radioactive tracers in study of mold wear.

Radioactive tracers have been successfully used by General Electric Co.'s Chemical Materials Dept. to study erosion in molds caused by plastic compounds. The method, said to detect and measure one part of metal in 20 million parts of plastics, has been used to improve thermosetting molding compounds.

An irradiated bushing is inserted in a standard transfer mold. The mold is then heated by high-pressure steam.

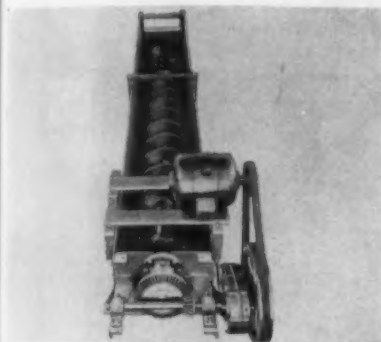
### Pressure Applied

After suitable temperature is built up, the molding compound is placed in the transfer pot, and pressure is applied. Pressure forces the melted material through the sprue bushing and the runners in the mold to the cavity. There, the material is formed into a molded slug.

After curing, the mold is opened and the molded part taken out. The part, containing tiny bits of metal eroded from the sprue bushing, is sent to GE's laboratory in Schenectady, N. Y., for measurement. There, the amount of minute particles detected is used as basis for determining how abrasive the molding compound was.

# NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 119 or 120.

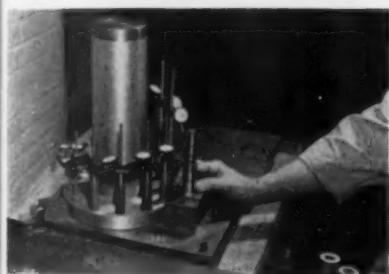


## Screw washer handles gravel, crushed stone

Coarse material such as gravel, crushed stone of approximately 2 in. maximum size is washed in a new type screw washer. Single and double screw models, with flight diameters of 20, 24, 30 and 36 in. accommodate various capacities: 60 to 185 tons per hr in single screw models; 105 to 325 tons per hr in the double screw models. Among

design features are a fabricated steel washing box; cut steel bevel gears; highly abrasive-resistant, chilled iron flights; and provisions for adjustable overflow wier. Hardened steel paddles at feed end help break down foreign material lumps. Grease-lubricated bearings are used. *McLanahan & Stone Corp.*

For more data circle No. 28 on postcard, p. 119.

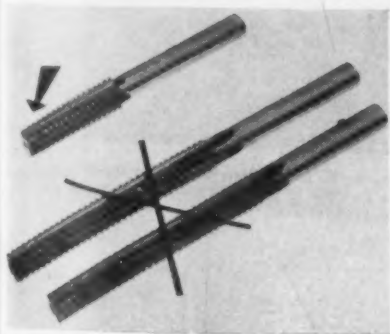


## Solution of an inspection problem

Checking the location of grooves in a cylindrical valve part for a precision grinding machine proved a time consuming job by usual inspection methods. Norton inspectors and engineers devised a quick method consisting of a precision turntable with 11 Federal dial in-

dicators mounted on the periphery at heights corresponding with the groove locations. As the table is turned, the indicators bear on each surface in succession. Inspection time per piece has been cut drastically. *Norton Co.*

For more data circle No. 29 on postcard, p. 119.

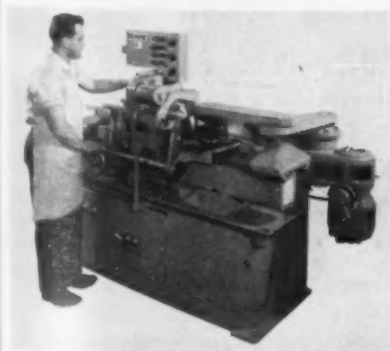


## Taps most Acme threads in a single pass

Secret of a single-pass Acme tap is the use of relatively fine lead-screw threads at the starting end. These threads are said literally to pull the heavier Acme thread cutting portion of the tap through the hole, much as the starting screw on a wood bit. Use of a lead screw feed is not recommended. The design not only eliminates up to two taps

and tapping operations formerly required, but also provides a more accurate, smoother thread with much less care and attention needed. The single-pass tap is available for single or multiple-start Acme threads in diameters from  $\frac{3}{4}$  to  $2\frac{1}{2}$  in. *Horspool & Romine Mfg. Co.*

For more data circle No. 30 on postcard, p. 119.



## Electronic machine mills master airfoils

Two completely new developments—a non-contacting tracer control, and a fair-curve interpolating system—are combined in this new electronic airfoil milling machine for generating original three-dimensionally contoured shapes from a series of simple cross-sectional templates. The machine, manufactured by New England Machine & Tool Co., has been proved in

actual job-shop manufacturing of (1) original airfoil masters, (2) master cams for production airfoil milling and grinding machines, (3) metal patterns for various blade casting processes, and (4) general experimental and prototype machining of airfoil shapes. *Pratt & Whitney.*

For more data circle No. 31 on postcard, p. 119.

Turn Page



## **VICKERS® VT16 PUMP NOW AVAILABLE FOR HYDRAULIC POWER STEERING OF TRUCKS AND MATERIALS HANDLING VEHICLES**

The Vickers Series VT16 pump is used more widely than all other makes combined for the power steering of automobiles. It is now available for the first time for the hydraulic power steering of trucks and materials handling vehicles. It has all the characteristics important to this service and is used in a separate hydraulic circuit for steering only.

### **COMPLETE PACKAGE**

Series VT16 has integral volume control valve and relief valve . . . also an integral oil reservoir. This is a complete hydraulic power package for steering.

### **SIMPLIFIED INSTALLATION**

This compact and complete power package is easily and quickly installed. All you need to do is bolt it on, make two hydraulic connections, and couple the power.

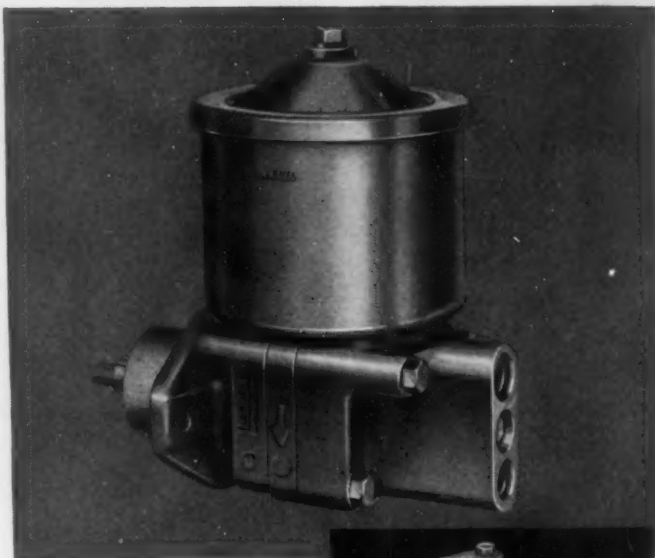
### **LONGER PUMP LIFE**

The exclusive Vickers "Hydraulic Balance" eliminates pressure-induced bearing loads and the consequent wear. These lighter bearing loads mean much longer bearing and pump life.

### **NO LOAD STARTING**

At rest and normal starting speeds, the sliding vanes are retracted; only after engine fires do vanes extend and pumping begin.

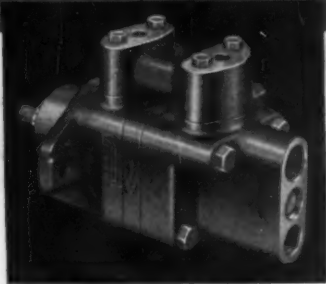
ASK FOR BULLETIN M-5104A



*Series VT16 Vickers Pump with integral volume control and relief valves and oil reservoir. For hydraulic power steering.*

### **HIGH OPERATING EFFICIENCY**

The vane type construction, hydraulic balance and automatic maintenance of optimum running clearances enable these pumps to deliver more oil with less power. This high operating efficiency is maintained throughout the long pump life.



*Series VT17 Vickers Pump is similar to the VT 16 except that it does not include the oil reservoir.*

**VICKERS Incorporated**  
DIVISION OF THE SPERRY CORPORATION  
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Application Engineering Offices: ATLANTA • CHICAGO (Metropolitan) • CINCINNATI • CLEVELAND • DETROIT • HOUSTON  
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## **VICKERS® HYDRAULIC POWER STEERING BOOSTER**



EFFORTLESS • POSITIVE • SHOCKLESS

**ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921**

6726

## New Equipment

Continued

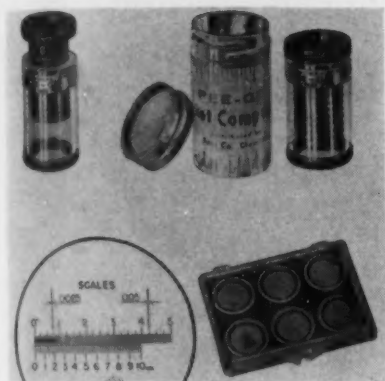


### New 50-ton compression and transfer presses

New compression and transfer molding presses are equipped with Stokes labor-saving high-production features, including the bar-type controller. This feature provides automatic control over every phase of the molding cycle by means of easily-positioned buttons located on graduated bars. Settings of the controller can be adjusted in seconds to meet new re-

quirements when molds are changed; they can be reset while the press is in operation. The presses are suitable for a one-press holding operation or as additions to a molder's existing equipment. They are high-speed, self-contained, fully hydraulic presses, with the highest ram speed. *F. J. Stokes Machine Co.*

For more data circle No. 32 on postcard, p. 119.

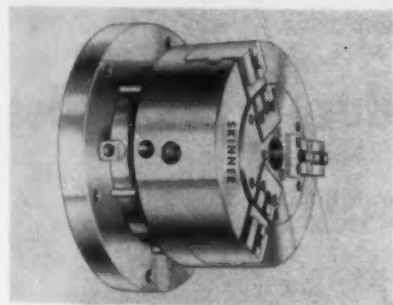


### Pocket comparator measures small dimensions

A precision optical instrument, the Pee Gee pocket comparator, is used to measure extremely small parts or minute dimensions on large parts. Measurements are accomplished through the use of a powerful magnifying lens and tiny transparent patterns called reticles. These recticles are actually extreme reductions of large precise Master layouts. The Scales rectile which

comes in the instrument, measures dimensions from 0.0025 to 0.5 in. in steps of 0.0025 and 0 to 0.10 mm in steps of 0.2 mm. Other recticles are radii, angles, threads, thickness, diameters and dimensions. Comparator is molded Lucite. Focusing is done by sliding the eye piece further in or out of the Lucite body. *National Tool Co.*

For more data circle No. 33 on postcard, p. 119.



### Wedge action effects tremendous gripping power

New power chuck fixture is closely coupled to make it the lowest, most compact unit. A non-rotating, air-operated fixture, it can be used on drilling, milling and transfer machines, and for assembly operations. The power chuck is self-centering and has tremendous gripping power due to its wedge action.

The fact that the angle of the operating wedge prevents the chuck from releasing the work, even though the air line is broken, makes the unit suitable for operations on transfer machines. Available in 8, 10, or 12 in. diam. with 2 or 3 jaws. *Skinner Chuck Co.*

For more data circle No. 34 on postcard, p. 119.



### Greater production claimed for new Payloader

Four-wheel-drive Payloader tractor-shovel with bucket capacity of 1 cu yd struck-load and 1 1/3 cu yd payload is available with either gas or diesel engine and is equipped with power-steering for ease of operation and maneuverability. Heavy-duty full-reversing trans-

mission provides four speed ranges in either direction. Greater production resulting from faster operation is claimed for this tractor-shovel as the result of the new torque-converter drive. *Frank G. Hough Co.*

For more data circle No. 35 on postcard, p. 119.



### Machine straightens and cuts off metal tubing

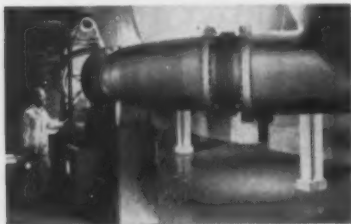
Compact, combination machine straightens and cuts off varying lengths of metal tubing from coil stock. It will handle nonferrous and ferrous tubing from 1/4 to 1 in. diam in adjustable lengths up to 6 ft. Designed as a utility, low cost, versatile machine for small

lot job shop production runs, it features flexibility of operation and quick changeover for various tube diameters and lengths. Coiled tubing up to 24 in. diam can be handled. *Walter P. Hill, Inc.*

For more data circle No. 36 on postcard, p. 119.

Turn to Page 232

**HEAT RESISTANCE:** ENDURO can handle gases from full scale thermal jet engines, reciprocating engines, turbines, burners and other equipment tested in simulated high altitude conditions.



**CORROSION-RESISTANCE:** This is one of ENDURO's best known qualities. Installations of various types over the past thirty years offer visible proof that ENDURO stands up under some of the toughest corrosive conditions.



**CLEANABILITY:** ENDURO's high resistance to radioactive matter makes it a choice for equipment where this material is used. The answer is its smooth finish which offers little surface to which particles can cling.



## Here's how they're using some of Enduro's properties

Aviation design engineers have long used ENDURO Stainless Steel for its high strength-to-weight ratio. Its resistance to high as well as sub-zero temperatures.

Now, designers in other fields are discovering new uses for ENDURO. For its remarkable ease of cleaning. For its satin luster. For its high resistance to rust and corrosion.

Management likes ENDURO, too. It can be fabricated profitably. And it gives extra sales features

to products which might otherwise be lost in the shuffle.

No other commercial metal offers such a unique combination of physical and chemical properties as ENDURO Stainless Steel, the metal of 10,000 uses. Republic will be glad to help you use it... profitably. Write to:

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Export Department: Chrysler Building, New York 17, N. Y.



**FREE**

This 36-page booklet gives properties, fabricating and joining methods, care and finishing of ENDURO Stainless Steels. Write for it. Ask for ADV. 561.

**REPUBLIC**  
**ENDURO STAINLESS STEEL**

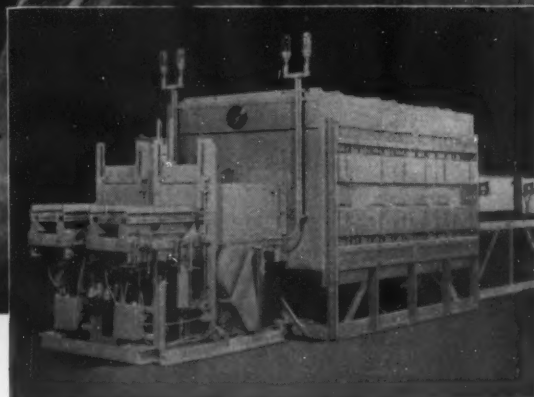


Other Republic Products include Carbon and Alloy Steels — Titanium — Pipe, Sheets, Strip, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing





↑ A lining of Lightweight B&W IFB Refractories being installed in Harper electric sintering furnace.



## Refractories Maintenance Cut Down ON HARPER ELECTRIC FURNACES AND KILNS

"Furnace linings that don't last as long as they should can shoot our customers' production costs 'sky high'—and take a big bite out of their profits."

That's one of the reasons why Harper Electric Furnace Corporation standardized on B&W Insulating Firebrick for the electric kilns and furnaces which they manufacture. They know from experience that "B&W IFB last longer than any insulating firebrick we ever tried."

The reason? Volume stable raw materials, unique quality control and manufacturing processes, including B&W's exclusive double burning at temperatures well above use limits—all these factors contribute to more uniform brick and longer life.

B&W IFB, the lightest weight insulating firebrick, also offer these advantages:

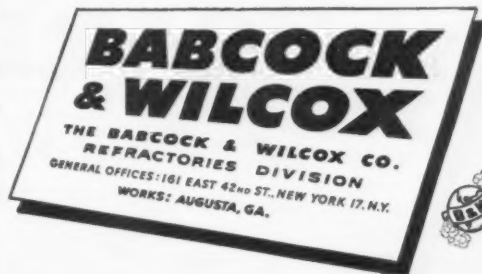
**Cut electricity or fuel costs—**Lighter in weight than any other insulating firebrick, B&W IFB store and conduct less heat. This means faster heating up time, less heat loss during furnace operation. Results? Lower electricity or fuel consumption—often 30% to 50% less than with ordinary heavy firebrick.

**Cut installation costs—**Hand fitting is easy and fast—B&W IFB can be cut, drilled or shaped on the job with ordinary hand woodworking tools.

**Cut down-time—**B&W IFB cool off quicker because they store less heat

—make possible quick access to the furnace for inspection. Furnace gets back on the line faster, too, because B&W IFB heat up quickly.

These savings explain why B&W Insulating Firebrick are being used in thousands of applications . . . from the largest industrial furnaces to the smallest kilns. Contact your local B&W Refractories Engineer. He may point the way to new savings in your furnace.



B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars



### the first is stock...

probably the largest stock of stainless plate in one location—produced to meet rigid chemical industry standards in a wide range of sizes, gauges and analyses.

### the second is delivery...

the amount of diversified stock regularly carried at G. O. Carlson, Inc. assures fast delivery on all of the more active types and gauges.

### and that's not all...

**Special cutting equipment** saves time and money where pattern cut stainless plate is required.

**Highly skilled employees** work on your orders—it's right when it comes from Carlson!

**Complete-package orders**—one order is sufficient for Carlson heads, rings, circles, flanges, forgings, bars and sheets (No. 1 Finish).

**Why shop around...call Carlson first!**

**G. O. CARLSON, INC.**  
Stainless Steels Exclusively  
Plates • Plate Products • Forgings • Bars • Sheets (No. 1 Finish)

THORNDALE, PENNSYLVANIA

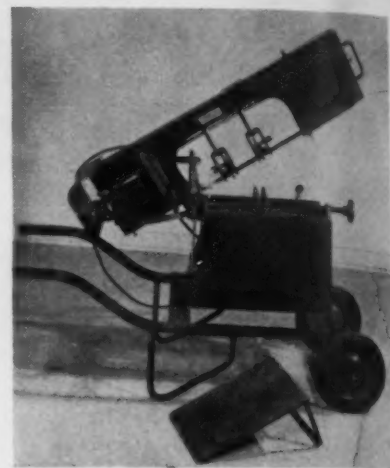
District Sales Offices in Principal Cities

## —New Equipment—

Continued

### Metal cutting saw

The operator actually has three saws incorporated within the Mighty Midget metal cutting band saw: horizontal cutoff; upright table band saw; angle cutting—at any degree up to 45°. No wrench

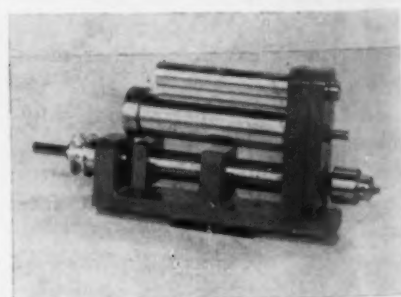


is required at any time to use the Mighty Midget in the various positions. Cutting carriage can be adjusted sideways by a knob to facilitate accurate placement of the blade with reference to the cutoff mark. Cutting capacity is 6 x 8 in. Dutch Stark Co.

For more data circle No. 37 on postcard, p. 119.

### Low cost drill head

Designed for maximum simplicity, this precision high speed drilling head has air feed with hydro check control. It is 12½ in. overall length x 2 in. wide, with full 2-in. stroke with fast return; is suited for multiple spindle drilling operations.



Sides and bottom of drill head body are machined square and parallel to spindle to simplify alignment of drill in setups. Drill head is also available mounted on T base. Tele-matic Corp.

For more data circle No. 38 on postcard, p. 119.  
Turn Page

## **WASH THAT DIRTY STRIP BEFORE SHEARING and BLANKING**

The latest development in McKay coil feed lines is this new strip washing machine which thoroughly cleans the strip after it leaves the coil and before it passes through any subsequent feed rolls.

In most stamping plants a sizeable portion of metal finishing costs and quality control problems can be traced to the fact that some coiled steel is dirty and much of this dirt picks up on the rolls of the processing equipment. The dirt which carries over on the blanks may cause scratches in the drawn panels during the forming operations. In several recent installations McKay has furnished a strip washing machine which utilizes

high speed brushes and large volume solvent sprays to thoroughly clean the steel strip at high production speed.

CONSULT McKay ENGINEERS  
IF YOU HAVE A PRESS OR  
SHEAR FEEDING PROBLEM. WE  
INVITE YOUR INQUIRIES.

**McKAY MACHINE Company**  
YOUNGSTOWN, OHIO



ENGINEERS AND DESIGNERS OF  
EQUIPMENT FOR THE AUTOMOTIVE,  
FABRICATING AND STEEL INDUSTRY

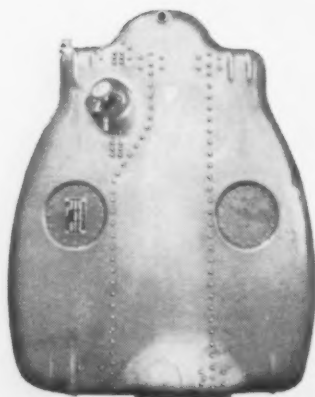


if  
it's  
really  
**UNUSUAL**

call



for mass production of



**FORMINGS  
STAMPINGS  
WELDMENTS**

in any type of metal



For example,  
aircraft tanks of  $\frac{1}{8}$ " drawn  
aluminum, produced  
in quantity, showing two  
halves with partition  
and component parts. Parts  
riveted to body of tank  
and the two halves then  
welded together to  
complete the assembly.

CHARLES T. BRANDT, INC., BALTIMORE 30, MARYLAND

## New Equipment

Continued

### Rust prevention

A time-saving method of rust prevention, utilizes 12-oz pressurized, pushbutton cans. Containing Rust Veto Spray, these handy dispensers provide a quick, clean and effective way to apply an even, transparent



protective film to metal parts. Handy for protecting small items such as tools, dies, gages, precision parts, hardware, and items being stored. Transparent film need not be removed when item is ready for use. *E. F. Houghton & Co.*

For more data circle No. 39 on postcard, p. 119.

### Tote pan dumper

Fully automatic in operation, a tote pan dumper elevates loaded tote pans any desired height up to 11 ft above the floor level, inverts the pan to empty the contents and



then returns the empty pan to loading level. Useful in feeding overhead hoppers or conveying systems. Weight to 500 lb per pan can be handled. *Allied Sales & Mfg. Co.*

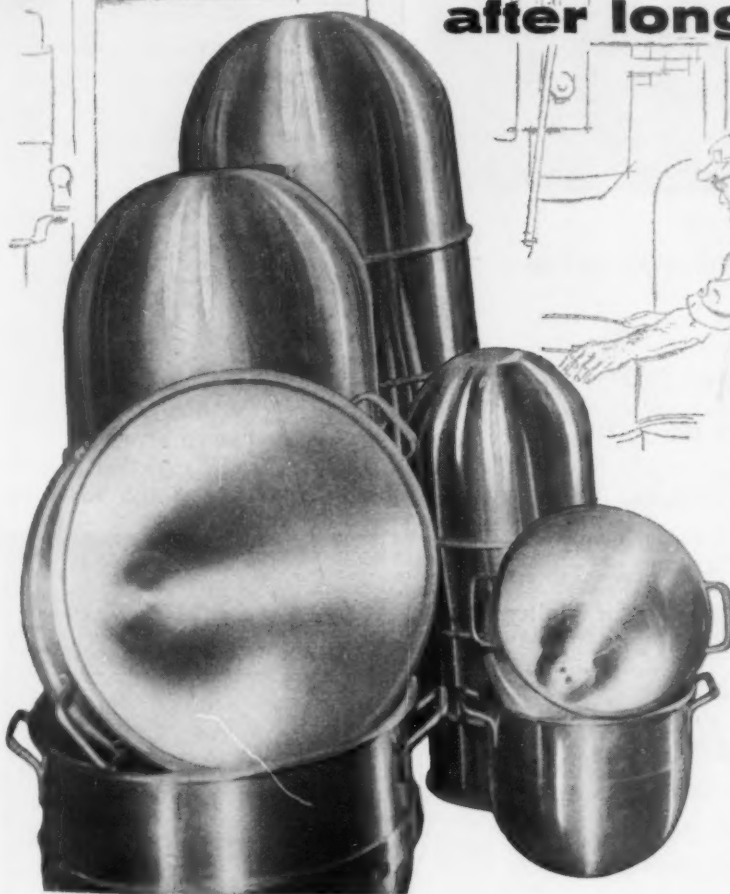
For more data circle No. 40 on postcard, p. 119.

Turn Page

Mixing bowls made of Crucible stainless steel by American Car and Foundry Company, at its Milton, Pennsylvania plant.

## CRUCIBLE STAINLESS STEEL

**keeps its shine  
after long, hard wear...**



The fact is stainless steel improves with wear, for the more it is used the harder and smoother the surface becomes. And there is never any surface plating to wear on a stainless product, for stainless steel is *stainless* all the way through.

Yes, Rezistal® stainless is a *natural* for products that must take long hard service, or that must resist corrosion or wear, or stand up under daily cleaning with strong detergents. Take, for example, the stainless mixing bowls shown. They'll give many years of trouble-free service. And their smooth, sanitary surface makes them especially suited to the processing of baked goods, candy, cosmetics or chemicals.

Be sure you take advantage of all the money- and time-saving qualities of stainless steel. And be sure you specify Crucible stainless... made by the country's leading producer of special purpose steels. You'll get fast delivery of the grade and size you need when you call Crucible.



### CRUCIBLE

first name in special purpose steels

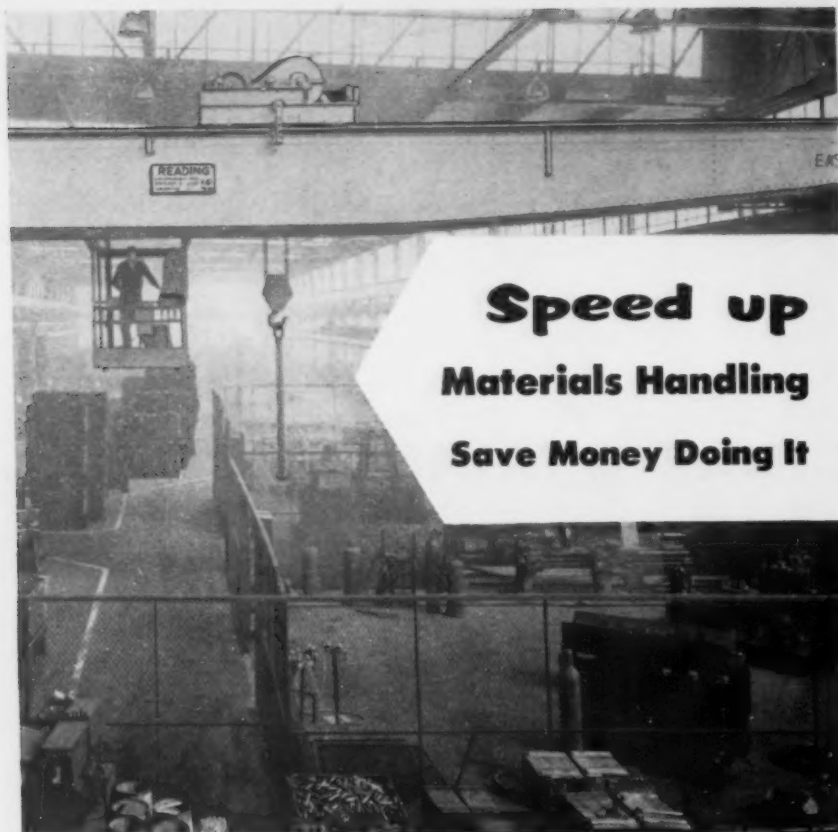
54 years of *Fine* steelmaking

## STAINLESS STEELS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.  
REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

June 24, 1954

235



**Speed up  
Materials Handling  
Save Money Doing It**

Yes, that's a strong promise. But it's being done right now in plants like yours. Here's how:

**Match the requirement of your job with a custom-built Reading crane at no extra cost**

Imagine, at what you'd normally pay for an "ordinary" crane, you can actually have one "tailor-made" for your own plant. For when you order a READING CRANE, our engineers offer you a choice of several interchangeable motor, trolley and hoisting units.

Known as UNIT CRANE DESIGN, this unique construction method assures greater operating efficiency. It enables you to move more materials at the lowest possible cost. And it helps you reduce maintenance time and save maintenance dollars—any unit can be removed for overhauling or repair without dismantling any other unit!

READING CRANE & HOIST CORPORATION 2101 Adams St., Reading, Pa.

**READING CRANES**

**CHAIN  
HOISTS**

**OVERHEAD TRAVELING  
CRANES**

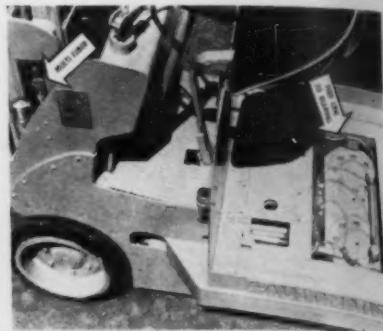
**ELECTRIC  
HOISTS**

## **New Equipment**

*Continued*

### **Central lubrication**

Built-in centralized lubrication has been introduced in Automatic's line of fork lift trucks. Top performance, convenience, safety and low-cost, trouble-free service are claimed for the system. With the



Multi-Luber, manufactured by Lincoln Engineering Co., the lift truck operator lubricates all vital steer-axle bearings simultaneously, with a single stroke of the control lever. *Automatic Transportation Co.*

For more data circle No. 41 on postcard, p. 119.

### **Electrical recorder**

New, universal electrical recorder produces a permanent, easy-to-read record and provides an automatic process that minimizes the chance for human error. It is designed to equip analytical measuring machines and hob and worm



lead machines for electrically recorded charts. A complete unit, structurally independent of the pickup, the recorder operates on 115 v 60 cycles ac; provides all the distinct advantages of automatic recording or graphic inspection. *Illinois Tool Works.*

For more data circle No. 42 on postcard, p. 119.

**Turn Page**





## Fast materials handling with Dependable American DiesElectric

Hundreds of materials handling jobs are solved by these easy-to-operate American DiesElectric Locomotive Cranes for industry across the country. Quick and economical, they cut maintenance costs to a minimum and keep production at a maximum.

In nearly every industry . . . steel, mining, pulp and paper, construction and industrial plants of all kinds . . . American DiesElectric Locomotive Cranes are streamlining operations in a way that adds to profits!

Fast, smooth-operating American DiesElectric Locomotive Cranes with diesel power to the deck, electric power to the trucks require a minimum of maintenance. In fact, detailed cost and operating records prove an American DiesElectric Locomotive Crane will write off its cost fully in five short years!

Cut the cost of materials handling—See American First! Our specialists are at your service. Write or call today!

Modernize...economize...with

### American Hoist

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For the  
BIG PRODUCTION  
jobs of industry...  
**AMERICAN  
LOCOMOTIVE  
CRANES**



## "Glass Wall" Installation Dramatizes Advantages of Kinnear Rolling Doors



### Heavily Galvanized Doubly Protected

Kinnear Steel Rolling Doors are heavily galvanized (1.25 oz. of zinc per sq. foot, as per ASTM standards) to provide a lasting weather resistance. In addition Kinnear Paint Bond, a special phosphate application, provides for easy, thorough paint coverage and lasting paint adhesion.

Light from a huge "glass wall" floods into the new engineering building at Howard University, Washington, D.C., shown above.

*The Kinnear Rolling Door centered in this glass wall can be operated or left open without blocking off a single inch of glass area.*

The rugged curtain of interlocking steel slats — originated by Kinnear — coils compactly above the opening. All surrounding floor, wall and ceiling space remains clear and usable *all the time.*

Notice also how the straight lines of the Kinnear curtain add to the modern appeal of this building.

In addition to this space-saving "self-contained action", Kinnear Steel Rolling Doors offer durable, low cost, all-metal protection against intruders, vandals, wind, weather, and fire.

Kinnear Rolling Doors are built in any size, with manual or motor operation. Write for full details.

## The KINNEAR Manufacturing Company

### FACTORIES:

1760-80 Fields Avenue  
Columbus 16, Ohio

1742 Yosemite Ave.  
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Offices and Agents in All Principal Cities



## New Equipment

Continued

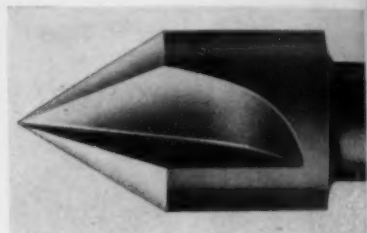
### Saves compound

The Econometer shows at a glance that the right amount, too much, or too little metal washing compound is being used in a metal washing operation. This new control instrument is not wired or piped into the machine. It is instantly ready for work as soon as plugged into any light socket. It prevents waste of compound, or failure to clean. *DuBois Co., Inc.*

For more data circle No. 43 on postcard, p. 113.

### Center reamers

High speed center reamers or countersinks with 90°, 100°, 110°, and 120° included angle are available. Sizes include 1/4 to 3/4 in.

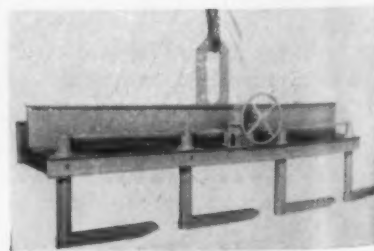


diam inclusive by 1/8's. Countersinks with 60° and 82° included angle are available in high speed and carbon steel, in sets. *Whitman & Barnes.*

For more data circle No. 44 on postcard, p. 113.

### Strip material grab

Rotating legs of this grab fit in between close-laid piles of narrow strip material, then swing under the load to take a lift without a supporting pallet. Floor space is



cut almost in half, because stacks need little more than the thickness of the grab leg between them instead of its length. *Mansaver Industries, Inc.*

For more data circle No. 45 on postcard, p. 113.

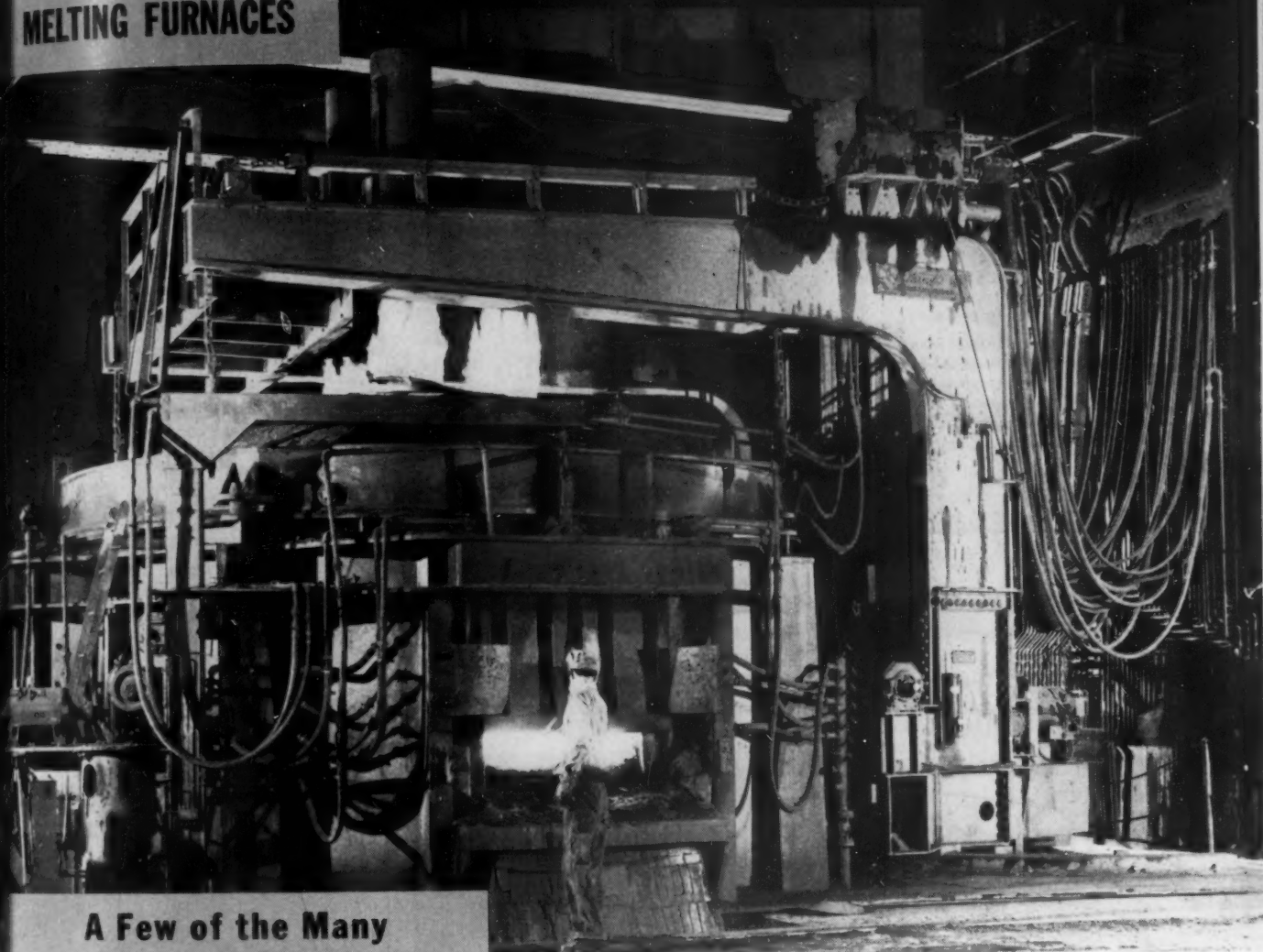
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# Heroult

## ELECTRIC

### MELTING FURNACES

TOPS FOR PRODUCTION OF HIGH GRADE STAINLESS, ALLOY AND RIMMING STEELS



**A Few of the Many  
Satisfied users of  
HEROULT FURNACES**

A. M. Byers Company  
Allegheny Ludlum Steel Corporation  
American Steel Foundries  
Crucible Steel Co. of America  
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Ohio Steel Foundry Company  
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The Timken Roller Bearing Company  
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#### NEW CATALOGUE NOW READY

Contains up-to-date information on Heroult Electric Melting Furnaces — types, sizes, capacities, ratings, etc. Write Pittsburgh Office for free copy.

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## the standard of efficiency and safety!

Embodying the latest in mechanical and electrical equipment, these widely used furnaces are noted for their efficient performance, safety, and low operating cost and maintenance.

We welcome an opportunity to help you select and install the furnace best suited to your particular requirements.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION  
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UNITED STATES STEEL



# REDUCE CYLINDER HANDLING

## Up to 50% with INDEPENDENT Gas Supply Trailers!

Here's the newest idea in gas service! Leave a full gas trailer with your customer . . . replace it with another when empty. Reduces cylinder handling up to 50% . . . cuts cylinder costs . . . gives customers the convenience of having uninterrupted gas supply.

Many gas manufacturers and haulers of compressed gas (including many government agencies), are already enjoying the many advantages of INDEPENDENT Gas Supply Trailers.

Available for all gases as authorized by ICC.



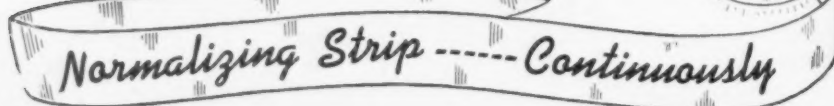
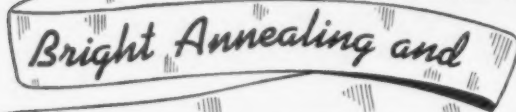
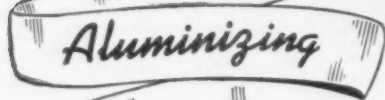
### INDEPENDENT ENGINEERING COMPANY, Inc.

CONSULTING ·  · RESEARCH

Manufacturers of  
CYLINDERS AND GAS PRODUCING EQUIPMENT  
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

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We Invite  
Your  
Inquiries



Strip in single or multiple strands up to a total width of 54" may be bright annealed or normalized, continuously, in this EF gas fired radiant tube installation. Capacity 7200 lbs. per hour.



A large capacity continuous strip normalizing, annealing and galvanizing unit. This is a combination EF gas fired radiant tube and electrically heated installation and is over 400 feet long.



THE  
ELECTRIC FURNACE CO.  
SALEM, OHIO

Gas Fired, Oil Fired and Electric Furnaces

Canadian Associates • CANEFECO LIMITED • Toronto 1, Canada

## New Equipment

Continued

### Locknut

New locknut is a unitary, solid metal piece, slotted cone shape on one end, splined cylinder on other, designed to be inserted in a countersunk hole. The nut is partially or completely seated in material and is held in position by force-fitted splines. After bolt is inserted, locking action is effected by the pressure of the sector threads forced against the bolt by the interference of the countersinks. Available in all metals and in all standard thread specifications. Locking action remains unaffected by high temperatures. No wrenching on nut end is required. Involves no more preparation than for flat head screw. *Allmetal Screw Products Co., Inc.*

For more data circle No. 46 on postcard, p. 119.

### Ball seat gage

Special ball seat gage checks the dimensions of the ball seats on the forward mounting struts on airplane engines. It provides a very accurate check of the inside diameter of the ball seats in ten-thousandths of an inch. The gaging di-



mension is transferred to the dial indicator by an auxiliary plunger. The gaging point is held against the working surface by a spring and the plunger is held by a spring firmly against the gaging point. Parts can be readily replaced should wear occur. *Brown & Sharpe Mfg. Co.*

For more data circle No. 47 on postcard, p. 119.

# THE IRON AGE SUMMARY...

- ◄ Metalworking plants to face steel wage "pattern"
- ◄ Price increases will follow the wage agreement
- ◄ Ingot rate down a point; scrap prices fall, too

**Wages . . .** Many of the nation's metalworking employers are holding their breaths this week, waiting for the impact of the steel wage settlement to reach them. It is expected that they will be asked to follow the "pattern" of the 5¢ to 8¢ per hour wage "package" of the steel industry.

This will not be a new experience for them. The painful precedent has been established through seven rounds of postwar wage increases.

**Competition . . .** But this year it will hurt more. Many manufacturers already find themselves hard pressed by unrelenting competition. There is intense pressure to keep both costs and prices down. Sales are generally lower, and so are profit margins. This year the competitive balance is so delicate that it could be shifted by a mere 5¢ to 8¢ per hour change in wage costs.

**Prices . . .** To make matters more difficult, steel prices are expected to be increased \$2 to \$3 a ton to cover higher wage costs. Increases are likely to be on a selective basis. This means that many steel consumers will be faced with higher costs on materials as well as wages.

They will resist steel price increases with all their might. But they will not be able to forestall them. They will recheck their steel needs to see if they can nullify cost increases by switching to alternate grades or sizes of steel.

Steel producers are conscious of the highly competitive market and customer resistance to higher prices. But they also feel the pressure of costs. And they remember that under price controls during the Korean War they were forced to absorb substantial wage costs. It was not until price controls were lifted early last year that steel prices were brought into line with costs.

It should be pointed out that steel users have benefited from substantial steel price cuts during the past nine months, even though the industry's base prices have remained relatively stable. Competition has forced some steel companies to (1) absorb freight charges, (2) trim extra charges, and (3) eliminate premium prices.

THE IRON AGE estimates that freight absorption alone has been costing steel companies at the rate of well over \$50 million a year.

**Scrap . . .** Steelmaking scrap prices slipped for the third week in a row. Declines this week lowered scrap 50¢ a ton to \$27.58 per gross ton.

**Production . . .** Steelmaking operations are scheduled at 72.5 pct of rated capacity, unchanged from last week's revised rate.

**Outlook . . .** Watch for a moderate dip in the steel market during July. It will be caused by vacations and over-ordering in June.

## Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
<b>Production</b> (Net tons, 000 omitted)	1,731	1,725	1,698	2,183
<b>Ingot Index</b> (1947-49=100)	107.8	107.4	105.7	135.9
<b>Operating Rates</b>				
Chicago	83.5	84.0	82.5	103.5
Pittsburgh	70.0	70.0*	69.0	99.0
Philadelphia	58.0	59.0	60.0	98.0
Valley	68.0	69.0	67.0	90.0
West	84.0	84.0	76.0	101.5
Detroit	89.0	95.0	84.0	104.0
Buffalo	67.5	67.5	67.5	106.5
Cleveland	66.0	66.0*	67.0	93.0
Birmingham	76.0	78.0	76.0	101.0
S. Ohio River	81.5	86.0	82.5	93.5
Wheeling	93.0	92.0*	90.0	101.0
St. Louis	73.0	72.5	34.5	82.5
East	65.0	60.5	58.5	84.0
<b>Aggregate</b>	72.5	72.5*	70.5	97.0

\* Revised. † Tentative

## Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
<b>Composite prices</b>				
Finished Steel, base	4.634	4.634	4.634	4.632
Pig Iron (gross ton)	\$56.59	\$56.59	\$56.59	\$55.26
Scrap, No. 1 hvy (gross ton)	\$27.58	\$28.08	\$28.25	\$42.17
<b>Nonferrous</b>				
Aluminum, ingot	21.50	21.50	21.50	20.50
Copper, electrolytic	30.00	30.00	30.00	29.875
Lead, St. Louis	13.80	13.80	13.80	13.30
Magnesium, ingot	27.75	27.75	27.75	27.00
Nickel, electrolytic	63.08	63.08	63.08	63.08
Tin, Straits, N. Y.	93.375	93.375	94.00	93.875
Zinc, E. St. Louis	11.00	11.00	10.25	11.00

# Steel Product Markets

## Vacations Bring July Sag in Uptrend

**Fabricators plan vacation shutdowns . . . Predict July as low-point in last half . . . August should see improvement resume . . . Tin plate, oil country, galvanized strong.**

Watch for a dip in the steel market during July. It probably will be the low point for last half of the year, although some executives foresee possibility of another slight decline sometime in September.

The July prediction is based chiefly on vacation plans of steel fabricators. Consumers of large tonnages have notified producers they will be shut down for 2-to-3 weeks, during which time steel receipts will be held to a minimum or cut off entirely as might be expected.

August is expected to bring a resumption of the creeping improvement in the steel market. Despite any temporary setbacks, producers are convinced the worst is over and that the trend is upward.

Indochina developments apparently are not influencing the market directly but may be tempering inventory reductions.

Tinplate, oil country goods, and galvanized sheets are strong points. Sheets, strip, bars, stainless, silicon, alloy, structurals, and plates are lagging in varying degree.

Steel warehouse business was improved in the Detroit area. Both inquiries and orders are up though tonnages have not improved appreciably. Chicago warehouses are still paring inventories.

**SHEETS AND STRIPS . . .** Market shows improvement in some areas. A Chicago producer's operating rate continues to improve. Detroit reports a temporary pickup but looks for dip in July. Pittsburgh mills still find the going tough. Galvanized sheets, bolstered by Government grain bin programs, continue strong. Galvanized warehouse price on West Coast was

### Purchasing Agent's Checklist

**STEEL:** Settlement will boost prices . . . . . p. 48

**GALVANIZED:** Pickup sees mills booked solid . . . . . p. 55

**LEAD:** Stockpiling program stabilizes prices . . . . . p. 47

**ALUMINUM:** West Coast boosts production, fabrication . . p. 81

advanced from \$9.10 per 100 lb in 10,000 lb bracket. Stainless demand shows no improvement. Silicon sheets continue dull with no sign of improvement as power and distribution transformer builders remain out of the market.

**BARS . . .** Pittsburgh mills report slight pickup. In Chicago the market is spotty and expected to weaken with reduced farm equipment and automotive ordering. In Detroit the pickup in automotive buying has not benefited bar producers as much as other products. Eastern mills got a shot in the arm from a \$4 million ordnance contract covering 230 mm atomic shells. Reinforcing bar demand in East continues good, reflecting highway, bridge, and school construction activities.

**STRUCTURALS . . .** Backlogs are declining in Chicago. Pittsburgh reports slight improvement with wide flange beams continuing in strong demand; standard structurals could use support from railroad car builders, but not much help is expected from that quarter. West Coast market is described as poor but producers are hopeful of pickup before end of year. Leading structural fabricators look for good third quarter on basis of upcoming bridge and building contracts; second quarter maintained by highway construction. Price cutting still a factor in fabricated structural market.

**PLATES . . .** Pittsburgh area mills report market still competitive; demand for heavy and wide plates stronger than for lighter sections. No sign of improvement in the East. Chicago finds outlook dull, with some reductions in production expected.

**WIRE . . .** Demand in Chicago area continues strong; several producers plan staggered vacations to maintain production for current orders and expected September demand. Construction products market looks good through September in East, where other wire products are in fair demand. Pittsburgh mills sketch a similar picture.

**TUBULAR . . .** Chicago market appears to be leveling off temporarily but outlook is good. Pittsburgh area mills report some improvement in demand for standard pipe and a continued strong market in oil country goods. In the East some strike-hedge buying of smaller sizes is noted at contractor level; oil country is booked 2 to 2½ months ahead; delivery on other than oil country running 2 weeks to a month.

**STAINLESS, TOOL, AND ALLOY . . .** Stainless market shows little change; order pattern has leveled off at low point. Warehouse sales of tool steel were off in May but orders at mill level are up about 10 pct as some companies are increasing inventories. Alloy mills think they will be out of the rut by September.

**WAREHOUSE . . .** West Coast outlet shifted quantity brackets on hot and cold-rolled sheets to encourage quantity buying. Differential in 10,000-19,999-lb bracket increased from 20¢ to 50¢; 20,000 to 39,999 lb from 40¢ to 75¢ and 40,000 lb and over from 50¢ to \$1; hot and cold-rolled sheets may not be combined for quantity purposes. Seattle warehouses worried over competition from Eastern mills who are offering less than carload lots at pool car prices on material normally handled by local warehouses; but consumer is saving money—as much as 3¢ per lb on stainless sheets. June brought upturn in sheet buying in Detroit, where inquiries and orders generally are up although tonnage moved is not significantly higher. Chicago outlets were reported still reducing their inventories.

(Cent  
Base  
Flat 8  
33.94; 45  
37.04; 75  
35.14; 45  
38.44; 75  
37.04; 45  
75S-OAL  
Plate,  
4S-F, 34,  
24S-OAL  
Extru  
5, 36.5¢  
to 26, 35  
Rod, 1  
43.5¢ to  
2S-F, 35  
Screw  
11/32-in.  
43.8¢; 1  
6000 lb.  
Drawn  
44.1¢ to  
60.1¢ to  
Extru  
to 2-in.,  
51.1¢; 4  
38.7¢ to  
Rodfin  
x 60 in.  
35.880;  
0.019 in.  
Sheet  
57¢; ¼  
Specific  
Extru  
in., 77¢  
56¢; 2½  
Base 1  
20,000 lb  
Extru  
weight;  
dicated;  
0.25 lb,  
59.7¢; 1  
lb, 28 in  
weight;  
to 1.  
30,000 lb  
Extru  
in. wall  
5/16 to  
in., 79¢  
in., 64¢  
alloys h  
lb; 1½  
Comm  
and str  
Wire, r  
forged,  
Sheet,  
Strip,  
Rod, 1  
Anales  
Plate,  
Seamle  
Shot, 1  
Copper  
Copper  
Copper  
Low  
Yellow  
Red h  
Naval  
Leade  
Com.  
Phos.  
Muntz  
Ni sil  
Beryll  
299  
S  
R  
Jun



# Nonferrous Prices

(Effective June 22, 1954)

## MILL PRODUCTS

(Cents per lb, unless otherwise noted)

### Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.136 in. and thicker, 2S, 3S, 33.9¢; 4S, 36.0¢; 52S, 38.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 35.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢; 0.032-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate, 1/4-in. and heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 35.5¢ to 82.8¢; 12 to 14, 37.2¢ to 99.0¢; 24 to 26, 39.9¢ to 112.9¢; 36 to 38, 47.2¢ to 115.9¢.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.5¢ to 37.2¢; cold-finished, 0.375 to 3.449-in., 2S-F, 3S-F, 47.6¢ to 39.3¢.

Screw Machine Stock: Rounds, 11S-T3, 1/2 to 11/32-in., 69.6¢ to 47.0¢; 3/4 to 1 1/2-in., 46.6¢ to 43.8¢; 1 9/16 to 3-in., 42.7¢ to 39.9¢. Base 5000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.8¢.

Extruded Tubing: Rounds, 63S-T5, OD 1 1/4 to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 61.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42 3/4 x 60 in., \$2.838; x 96 in., \$4.543; x 120 in., \$5.680; x 144 in., \$6.816. Coiled sheet, per lb, 0.019 in. x 28 in., 30.8¢.

### Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O 1/4 in., 56¢; 3/16 in., 57¢; 1/8 in., 60¢; 0.064 in., 73¢; 0.032 in., 94¢. Specification grade higher. Base 30,000 lb.

Extruded Round Rod: M, diam 1/4 to 0.311 in., 77¢; 1/2 to 3/4 in., 60.5¢; 1 1/4 to 1.749 in., 66¢; 2 1/2 to 5 in., 51.5¢. Other alloys higher. Base up to 3/4 in. diam, 10,000 lb; 3/4 to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft. for perimeters less than size indicated: 0.10 to 0.11 lb, 8.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to 1/2 lb, 10,000 lb; 1/2 to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, 1/4 to 5/16 in., \$1.43; 5/16 to 3/4 in., \$1.29; 3/4 to 1 in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall: OD, 3/4 to 1 in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1 1/2 in., 10,000 lb; 1 1/2 to 3 in., 20,000 lb; over 3 in., 30,000 lb.

### Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, \$15; Plate, HR, \$12; Wire, rolled and/or drawn, \$11; Bar, HR or forged, \$6; Forgings, \$8.

### Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	86 1/2	67 1/2	92 1/2
Strip, CR	92 1/2	70 1/2	98 1/2
Rod, bar	82 1/2	65 1/2	88 1/2
Angles, HR	82 1/2	65 1/2	88 1/2
Plate, HR	84 1/2	66 1/2	90 1/2
Seamless tube, 115 1/2	100 1/2	137 1/2	
Shot, blocks	60		

### Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	46.41	44.73	48.48
Copper, h-r	48.38	44.73	
Copper, drawn		45.98	
Low brass	44.47	44.41	
Yellow brass	41.72	41.66	
Red brass	45.44	45.38	
Naval brass	45.76	40.07	
Lead brass			39.11
Conn. bronze	46.95	46.89	
Mang. bronze	49.48	43.62	45.18
Phos. bronze	66.58	67.08	
Muntz metal	43.96	39.77	41.02
NI silver, 10 pct	55.36		62.63
Beryllium copper, CR, 1.9% Be, Base 2000 lb, f.o.b.			
Strip			\$1.63
Rod, bar, wire			1.65

## PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed 21.50  
Aluminum pig 20.00  
Antimony, American, Laredo, Tex. 28.50  
Beryllium copper, per lb conta'd be. \$40.00  
Beryllium aluminum 5% Be, Dollars per lb contained Be \$72.75  
Bismuth, ton lots \$2.25  
Cadmium, de'd \$1.70  
Cobalt, 97-99% (per lb) \$2.60 to \$2.67  
Copper, electro, Conn. Valley 30.00  
Copper, Lake, delivered 30.00  
Gold, U. S. Treas., per troy oz. \$35.00  
Indium, 99.8%, dollars per troy oz. \$2.25  
Iridium, dollars per troy oz. \$165 to \$175  
Lead, St. Louis 13.80  
Lead, New York 14.00  
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig 27.00  
Ingot 27.75  
Magnesium, sticks, 100 to 500 lb, 46.00 to 48.00  
Mercury, dollars per 76-lb flask, f.o.b. New York \$275 to \$280  
Nickel electro, f.o.b. N. Y. warehouse 63.08  
Nickel oxide sinter, at Copper Creek, Ont., contained nickel 56.25  
Platinum, dollars per troy oz. \$21.00  
Platinum, dollars per troy oz. \$84 to \$87  
Silver, New York, cents per troy oz. 85.25  
Tin, New York 93.375  
Titanium, sponge, grade A-1 44.72  
Zinc, East St. Louis 11.00  
Zinc, New York 11.50  
Zirconium copper, 50 pct 46.20

## REMELTED METALS

### Brass Ingot

(Cents per lb delivered carloads)

85-5-5-5 ingot  
No. 115 27.00  
No. 120 26.25  
No. 123 26.75  
80-10-10 ingot  
No. 305 31.50  
No. 315 29.25  
88-10-2 ingot  
No. 210 41.25  
No. 215 37.75  
No. 245 33.25  
Yellow ingot  
No. 405 23.25  
Manganese bronze  
No. 421 26.75

### Aluminum Ingot

(Cents per lb de'd 30,000 lb and over)

95-5 aluminum-silicon alloys  
0.30 copper, max. 22.50-22.75  
0.60 copper, max. 22.25-22.50  
Piston alloys (No. 122 type) 20.00-21.25  
No. 12 alum. (No. 2 grade) 19.25-19.75  
108 alloy 19.75-20.25  
195 alloy 21.00-21.50  
13 alloy (0.60 copper max.) 22.25-22.50  
ASX-679 19.75-20.25

### Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97 1/2% 20.00-20.50  
Grade 2—92-95% 19.00-19.50  
Grade 3—90-92% 18.00-18.50  
Grade 4—85-90% 17.00-17.50

## ELECTROPLATING SUPPLIES

### Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper  
Cast, oval, 15 in. or longer 42.64  
Electrodeposited 41.88  
Flat rolled 45.04  
Brass, 80-20  
Cast, oval, 15 in. or longer 43.515  
Zinc, flat cast 20.25  
Ball, anodes 18.50  
Nickel, 99 pct plus  
Cast 84.00  
Cadmium \$1.70  
Silver 999 fine, rolled, 100 oz. lots per troy oz., f.o.b. Bridgeport, Conn. 94 1/2

### Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum 63.00  
Copper sulfate, 99.5 crystals, bbl. 12.85  
Nickel salts, single or double, 4-100 lb bags, frt. allowed 30.00  
Nickel chloride, 375 lb drum 38.00  
Silver cyanide, 100 oz. lots, per oz. 75 1/2  
Sodium cyanide, 96 pct domestic 200 lb drums 19.25  
Zinc cyanide, 100 lb drum 64.30

## SCRAP METALS

### Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25 1/4
Yellow brass	19 1/2	18
Red brass	23	22 1/4
Comm. bronze	23 1/2	23 1/2
Mang. bronze	18 1/2	17 1/2
Yellow brass rod ends	19 1/2	

### Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27 —27 1/4  
No. 2 copper wire 25 1/2 —25 1/2  
Light copper 24 —24 1/4  
Refinery brass 22 1/2 —23  
Dry copper content.

### Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27 —27 1/4  
No. 2 copper wire 25 1/2 —25 1/4  
Light copper 24 —24 1/4  
No. 1 composition 21 1/2  
No. 1 comp. turnings 20 1/2  
Rolled brass 17 1/2  
Brass pipe 18 1/2  
Radiators 17 1/2 —17 1/2  
Aluminum  
Mixed old cast 12 —12 1/2  
Mixed new clips 13 —13 1/2  
Mixed turnings, dry 12 1/2 —13  
Pots and pans 12 —12 1/2

### Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

### Copper and Brass

No. 1 heavy copper and wire 24 1/2 —25  
No. 2 heavy copper and wire 23 —23 1/4  
Light copper 21 —21 1/4  
New type shell cuttings 15  
Auto radiators (unsweated) 19 —19 1/2  
No. 1 composition 18 1/2 —19  
No. 1 composition turnings 18 1/2 —19  
Unlined red car boxes 16 —16 1/2  
Cocks and faucets 16 —16 1/2  
Mixed heavy yellow brass 15 1/2  
Old rolled brass 16 1/2 —17  
Brass pipe 16 1/2 —17  
New soft brass clippings 17 1/2 —18  
Brass rod ends 15 —16  
No. 1 brass rod turnings 14 —15

### Aluminum

Alum. pistons and struts 7 —8  
Aluminum crankcases 10  
2S aluminum clippings 13  
Old sheet and utensils 10  
Borings and turnings 6 —7  
Misc. cast aluminum 10  
Dural clips (24S) 11

### Zinc

New zinc clippings 6 —6 1/2  
Old zinc 4 1/2 —5  
Zinc routings 3 —3 1/4  
Zinc die cast scrap 3 —3 1/4

### Nickel and Monel

Pure nickel clippings 60 —65  
Clean nickel turnings 40  
Nickel anodes 60 —65  
Nickel rod ends 60 —65  
New Monel clippings 23 —25  
Clean Monel turnings 16 —18  
Old sheet Monel 21 —23  
Nickel silver clippings, mixed 15  
Nickel silver turnings, mixed 13

### Lead

Soft scrap lead 10 1/2 —11 1/4  
Battery plates (dry) 5 1/2 —6  
Batteries, acid free 4 1/2

### Magnesium

Segregated solids 18 1/2 —19  
Castings 17 1/2 —18

### Miscellaneous

Block tin 75 —80  
No. 1 pewter 55 —60  
No. 1 auto babbitt 45 —48  
Mixed common babbitt 12 1/2 —13  
Solder joints 16 1/2  
Siphon tops 45  
Small foundry type 15 1/2  
Monotype 14  
Lino. and stereotype 13  
Electrotype 11 1/4  
Hand picked type sheets 8 1/2  
Lino. and stereo. dross 5 1/4 —5 1/2  
Elect. dross 3 1/2 —4

## Lead, Zinc Regain Lost Balance

**Despite actual stockpile buying, heavy smelter stocks hold markets down . . . Prices stable . . . Copper refinery stocks melt under stockpile buying—By R. L. Hatschek.**

Following all the confusion which resulted from price secrecy in the Government's "new look" stockpiling program, lead and zinc markets settled back to a more realistic pace.

As soon as it became apparent that this buying would not absorb huge tonnages and drive prices skyward, purchasing men relaxed some of their own buying efforts. Nevertheless, lead and zinc now stand in definitely firmer positions and price cuts are out of the question.

Copper and aluminum are maintaining themselves well. The red metal is definitely on the tight side and demand for aluminum is fairly good and quite steady.

**LEAD . . .** The market has at least returned to an even keel with clarification of the government's long-range stockpiling program (See page 47). General Services Administration has accepted offers of lead at the current market price but consumers still aren't over-anxious to jump into the market.

Apparently, the government's setting of a ceiling price for lead at 14¢ per lb pinpricked the market and it may take a while to regain steam despite the elimination of that ceiling. Producer stocks remain at approximately 100,000 tons and consumers are sure that new stockpiling won't

eat that up in a hurry even though the GSA purchases were reported to be of fairly good tonnages.

**ZINC . . .** New purchases of zinc were also made by GSA but there seems to be no reliable indication of tonnage. Some say it was healthy, others that it wasn't. Again it's the oversize smelter inventory of better than 200,000 tons that is preventing further strength from creeping in. But with the government now in the market at the going price, there is no chance of a price cut.

Senator Clinton P. Anderson, D., N. Mex., last week went on record with a blast at the stockpiling program. He's not against stockpiling—but he thinks it isn't being handled right. In the Senator's opinion, there ought to be a floor price if the program is to be of any real value in persuading mine owners to resume production.

Sen. Anderson's suggestions are not likely to be incorporated in the program—but lead and zinc producers could get further aid from Washington through import restrictions or boosted tariffs.

**COPPER . . .** Stocks of refined copper held by producers in this country plunged 42,412 tons during May, according to Copper Institute statistics for the month. While deliveries to fabricators stood at their peak for this year, 111,005 tons, it was delivery of some 40,000 tons to

the national strategic stockpile that contributed most to this decline which brought stocks to 82,111 tons. This is the lightest refinery stock reported since last September.

Stocks held outside the U. S. declined 17,836 tons on deliveries to fabricators totaling 115,197 tons and refined production of 95,564 tons. Domestic output of refined copper was 108,403 tons, a 4000-ton decline from the preceding month.

Marketwise, copper remains very strong except in scrap. It is reported that foreign demand is diminishing steadily at earlier prices (slightly above domestic prices) and tonnages are slipping. Domestic scrap prices continue to hold firm, however, though loss of foreign outlets may presage some softness.

A strike vote has been authorized in the copper industry by delegates of the International Union of Mine, Mill and Smelter Workers. The union is demanding a 25¢ per hour wage boost among other things and states producers have not yet made any counter offers. Talks between Mine, Mill and the "Big Four" are 6 weeks old.

**ALUMINUM . . .** There's still no word from Washington on the status of the on-again-off-again third round aluminum expansion. Office of Defense Mobilization has indicated that some announcement would be made "shortly." It's been rumored that the round would be killed. But even if it does finally die, it's expected that work will continue on plants where construction is already under way.

**TIN . . .** Dullness has pervaded the tin market for the past week with prices fluctuating slightly at about prior levels.

International Tin Agreement still needed more signatures for ratification as this issue went to press and tin traders were being extremely careful in order not to disrupt the market's serenity.

**MERCURY . . .** Prices continue to rack up new records but changes are no longer being made with daily frequency. Consumer resistance has built up to a high level but third party assistance will be needed to help pull them out of their difficulties. They're looking to Washington for this—but so far nothing has been forthcoming.

### NONFERROUS METAL PRICES

(Cents per lb except as noted)

	June 16	June 17	June 18	June 19	June 21	June 22
Copper, electro, Conn. . . .	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake, delivered . .	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York . . .	93.625	93.625	93.375	.....	93.375	93.375*
Zinc, East St. Louis . . . .	11.00	11.00	11.00	11.00	11.00	11.00
Lead, St. Louis . . . . .	13.80	13.80	13.80	13.80	13.80	13.80

Note: Quotations are going prices

\*Tentative



COPPER DETERMINATION

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# Iron and Steel Scrap Markets

## Doldrum Price Drops Hit Weak Market

**Summer slump acts to depress an already slow market . . .  
Prices on steelmaking grades drop \$1 in several centers, hold  
shaky line in others . . . Cast up \$1 on West Coast.**

Last week's dull market grew even quieter this week. Slow sales in Chicago, plus expected vacation shutdowns ahead served to drop prices about \$1 in all grades in that center.

THE IRON AGE Composite reflected the downtrend, dropping 50¢ to \$27.58. Prices remained unchanged in both Philadelphia and Pittsburgh although markets were reported weak and shaky in both centers.

Openhearth grades slipped \$1 in Cleveland and Detroit, but some spot buying kept Valley prices firm. Cincinnati prices were unchanged but show possibility of a drop in the near future.

Cast scrap was moving in Birmingham this week, but prices were unchanged. Cast continued to be a hot item on the West Coast, with another \$1 increase at top range in both San Francisco and Los Angeles.

East Coast markets match the seasonal dullness generally felt. Prices remained unchanged although reported weak. Cast scrap was holding steady in New York, although mixed cupola cast dropped \$1 per ton in Boston.

Pittsburgh . . . Brokers and dealers take a dim view of prospects for balance of the summer. Prices are shaky as consumers stay out of the market and July looms as one of the year's low points for steel production. One broker reports his volume today is about 50 pct off from last January, itself a slow month. Pressure for lower prices is expected to grow, barring an unexpected spurt in the ingot rate.

Chicago . . . In an already slow market, poor prospects for the weeks ahead began to depress Chicago prices last week, with all grades being affected. Though mill inventories have

been reducing for some time, buying is expected low through a considerable portion of July. Drops in steelmaking grades and railroad, which had been steady, had the effect of weakening every grade on the list. Dealers report broker buying extremely low. Railroad activity has been fairly strong but even here mill sales continued to slip. Foundry grades, though spotty, were generally weaker in the Chicago area.

Philadelphia . . . Prices on all items remain unchanged in this district but the market undertone is definitely weak. Something under 5000 tons of No. 1 and No. 2 heavy melting steel is expected to be exported from this port next month. Prices are still in question but it's unlikely they'll have any effect on the local market.

New York . . . Trading here is as dull as it's ever been—practically nonexistent. Market is confused and weakness is the general feeling. Cast continued to hold steady in spite of coming foundry vacations. At least one foundry is reported making arrangements to accept scrap during its vacation shutdown.

Detroit . . . The Detroit market started a decline that most of the trade believes has run its course. Chicago indifference and vacation closing of 2 electric mills locally presage serious doldrums in forthcoming weeks. Turnings dropped slightly and all openhearth and electric grades skidded somewhat on the basis of best standing offers.

Cleveland . . . Openhearth grades went down \$1 on appraisal as summer softness continued to stifle shipments. Most brokers expect relative inactivity to carry over until early fall. So far there has not been any noticeable effort by mills to push prices down. Premium heavy melting scrap is a scarce item in local yards. Spot buying has kept Valley prices firm.

Birmingham . . . Considerable cast scrap moved in the district this week at unchanged prices. Dealers say it is becoming a little more plentiful. Pig iron sales also are reported improving and inventories are being worked off. There is little demand for steel scrap, but some blast furnace grades are being bought at going prices. Prices on all grades were unchanged.

St. Louis . . . Sale of more than 100 carloads of a railroad list was made during the week at prices \$1 lower than previous IRON AGE quotations, but prices of other items were sustained. Receipts are steady and equal mill needs. No heavy buying is expected until after the Fourth of July holiday.

Cincinnati . . . Price stability has been shaken slightly by bearish possibility of a drop. There were no new quotations in evidence at presstime, but bidding on industrial lists and strike wariness were definite factors. Dealers with an eye on July orders are much more willing to sell than they were a few weeks ago.

Buffalo . . . Prices on No. 2 heavy melting and No. 2 bundles jumped \$1 per ton on new business to a leading mill. Dealers were encouraged as the orders enabled them to cut into heavy yard stocks. Other grades held steady. Water receipts became a market factor as approximately 4000 tons arrived from the Eastern Seaboard by barge.

Boston . . . Demand seems completely lacking in the New England scrap market. Only one price change was effected during the week, mixed cupola cast dropping \$1 per ton to a range of \$25 to \$26. This grade was incorrectly quoted at \$36 to \$37 last week. It should have read \$26 to \$27.

West Coast . . . Cast continued to grow hot, with another \$1 increase at top range in both Los Angeles and San Francisco, as buyers bargained for what little is available. Bottom range also increased from \$39 to \$43. Entire West is still being scoured for cast but little additional is expected unless the price of steel scrap increases. Steelmaking scrap is unchanged but dealers hope for some increase with announcement of July orders later this week.



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## Scrap Prices

(Effective June 22, 1954)

### Pittsburgh

No. 1 hvy. melting	\$29.00 to \$30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and ms. turns	15.00 to 16.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs, plate	31.00 to 32.00
Heavy turnings	28.00 to 29.00
No. 1 RR. hvy. melting	31.00 to 32.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft and under	43.00 to 44.00
RR. steel wheels	35.00 to 36.00
RR. spring steel	35.00 to 36.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	43.00 to 44.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	31.00 to 32.00

### Chicago

No. 1 hvy. melting	\$30.00 to \$31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 factory bundles	32.00 to 33.00
No. 1 dealers' bundles	30.00 to 31.00
No. 2 dealers' bundles	21.00 to 22.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Low phos. forge crops	36.00 to 37.00
Low phos. punch'gs, plate	33.00 to 34.00
Low phos. 3 ft and under	32.00 to 33.00
No. 1 RR. hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	37.00 to 38.00
Rerolling rails	43.00 to 44.00
Rails 2 ft and under	44.00 to 45.00
Locomotive tires, cut	33.00 to 34.00
Cut bolsters & side frames	35.00 to 36.00
Angles and splice bars	37.00 to 38.00
RR. steel car axles	40.00 to 41.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	40.00 to 41.00
Cupola cast	36.00 to 37.00
Heavy breakable cast.	30.00 to 31.00
Cast iron brake shoes	32.00 to 33.00
Cast iron car wheels	33.00 to 35.00
Malleable	40.00 to 42.00
Stove plate	32.00 to 33.00

### Philadelphia Area

No. 1 hvy. melting	\$22.00 to \$23.50
No. 2 hvy. melting	20.00 to 21.50
No. 1 bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	16.00 to 17.00
Clean cast chem. borings	22.00 to 23.00
Low phos. 5 ft and under	24.00 to 25.00
Low phos. 2 ft and under	25.00 to 26.00
Low phos. punch'gs	25.00 to 26.00
Elec. furnace bundles	23.00 to 24.00
Heavy turnings	21.00 to 22.00
RR. steel wheels	31.00 to 32.00
RR. spring steel	31.00 to 32.00
Rails 18 in. and under	41.00 to 42.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	35.00 to 36.00
Cast iron car wheels	38.00 to 39.00
Malleable	38.00 to 39.00
Unstripped motor blocks	27.00 to 28.00
No. 1 machinery cast.	39.00 to 40.00
Charging box cast.	36.00 to 37.00

### Cleveland

No. 1 hvy. melting	\$27.00 to \$28.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	27.00 to 28.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	27.00 to 28.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut struct'l & plate, 2 ft & under	33.50 to 34.50
Drop forge flashings	27.00 to 28.00
Low phos. 2 ft & under	29.00 to 30.00
No. 1 RR. heavy melting	29.00 to 30.00
Rails 3 ft and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Railroad grate bars	27.00 to 28.00
Steel axle turnings	19.00 to 20.00
Railroad cast.	41.00 to 42.00
No. 1 machinery cast.	42.00 to 43.00
Stove plate	34.00 to 35.00
Malleable	40.00 to 41.00

## Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

### Youngstown

No. 1 hvy. melting	\$29.00 to \$30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. plate	31.00 to 32.00

### Buffalo

No. 1 hvy. melting	\$26.00 to \$27.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 busheling	26.00 to 27.00
No. 1 bundles	26.00 to 27.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	14.50 to 15.50
Mixed bor. and turn.	17.50 to 18.50
Shoveling turnings	18.00 to 18.50
Cast iron borings	17.50 to 18.50
Low phos. plate	29.00 to 30.00
Scrap rails, random lgth.	33.00 to 34.00
Rails 2 ft and under	40.00 to 41.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	41.00 to 42.00
No. 1 cupola cast.	37.00 to 38.00

### Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	\$22.00 to \$23.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 bundles, openhearth	24.00 to 25.00
No. 2 bundles	18.00 to 19.00
New busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	8.00 to 9.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. punch'gs, plate	23.00 to 24.00
No. 1 cupola cast.	34.00
Heavy breakable cast.	25.00
Stove plate	30.00
Automotive cast.	35.00

### St. Louis

No. 1 hvy. melting	\$25.00 to \$26.00
No. 2 hvy. melting	23.50 to 24.50
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.50 to 20.50
Machine shop turn.	12.00 to 13.00
Cast iron borings	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
No. 1 RR. hvy. melting	30.00 to 31.00
Rails, random lengths	38.00 to 39.00
Rails, 18 in. and under	43.00 to 44.00
Locomotive tires, uncut	31.00 to 32.00
Angles and splice bars	31.00 to 32.00
Std. steel car axles	40.00 to 41.00
RR. spring steel	31.50 to 33.50
Cupola cast.	42.00 to 43.00
Hvy. breakable cast.	29.00 to 30.00
Cast iron brake shoes	30.00 to 31.00
Stove plate	37.00 to 38.00
Cast iron car wheels	30.00 to 31.00
Malleable	37.00 to 38.00
Unstripped motor blocks	27.00 to 28.00

### New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	\$16.00 to \$17.00
No. 2 hvy. melting	13.00 to 14.00
No. 2 bundles	12.00 to 13.00
Machine shop turn.	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	8.00 to 9.00
Clean cast chem. borings	16.00 to 17.00
No. 1 machinery cast.	35.00 to 36.00
Mixed yard cast.	29.00 to 30.00
Charging box cast.	29.00 to 30.00
Heavy breakable cast.	29.00 to 30.00
Unstripped motor blocks	22.00 to 23.00

### Birmingham

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	18.00
No. 1 bundles	20.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	20.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	13.00 to 14.00
Electric furnace bundles	26.00 to 27.00
Bar crops and plate	29.00 to 30.00
Structural and plate, 2 ft	29.00 to 30.00
No. 1 RR. hvy. melting	26.00 to 27.00
Scrap rails, random lgth.	34.00 to 35.00
Rails, 18 in. and under	37.50 to 38.50
Angles & splice bars	36.00 to 37.00
Rerolling rails	39.00 to 40.00
No. 1 cupola cast.	43.50 to 44.50
Stove plate	40.50 to 41.50
Charging box cast.	19.00 to 20.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	34.50 to 35.50
Mashed tin cans	16.00 to 16.00

### Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	\$16.50 to \$17.00
No. 2 hvy. melting	14.50 to 15.00
No. 1 bundles	16.50 to 17.00
No. 2 bundles	11.00 to 12.25
No. 1 busheling	16.00 to 17.00
Elec. furnace, 3 ft & under	17.00
Machine shop turn.	3.00 to 4.00
Mixed bor. and short turn.	6.00 to 7.00
Shoveling turnings	8.00 to 9.00
Clean cast chem. borings	11.00 to 12.00
No. 1 machinery cast.	27.00 to 29.00
*Mixed cupola cast.	25.00 to 26.00
Heavy breakable cast.	23.50 to 24.00
Stove plate	24.00 to 25.00
Unstripped motor blocks	7.00 to 8.00
*Correct price last week.	26.00 to 27.00

### Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	\$27.00 to \$28.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	27.00 to 28.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.50 to 14.50
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos., 18 in. & under	32.00 to 33.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	38.00 to 39.00
Hvy. breakable cast.	36.00 to 37.00
Drop broken cast.	44.00 to 45.00

### San Francisco

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	18.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Cast iron borings	9.00
No. 1 RR. hvy. melting	23.00
No. 1 cupola cast.	\$43.00 to 46.00

### Los Angeles

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	17.00
No. 2 bundles	\$15.50 to 16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Shoveling turnings	7.00 to 9.00
Cast iron borings	7.00 to 9.00
Elec. fur. 1 ft and under	25.00
No. 1 RR. hvy. melting	20.00
No. 1 cupola cast.	43.00 to 45.00

### Seattle

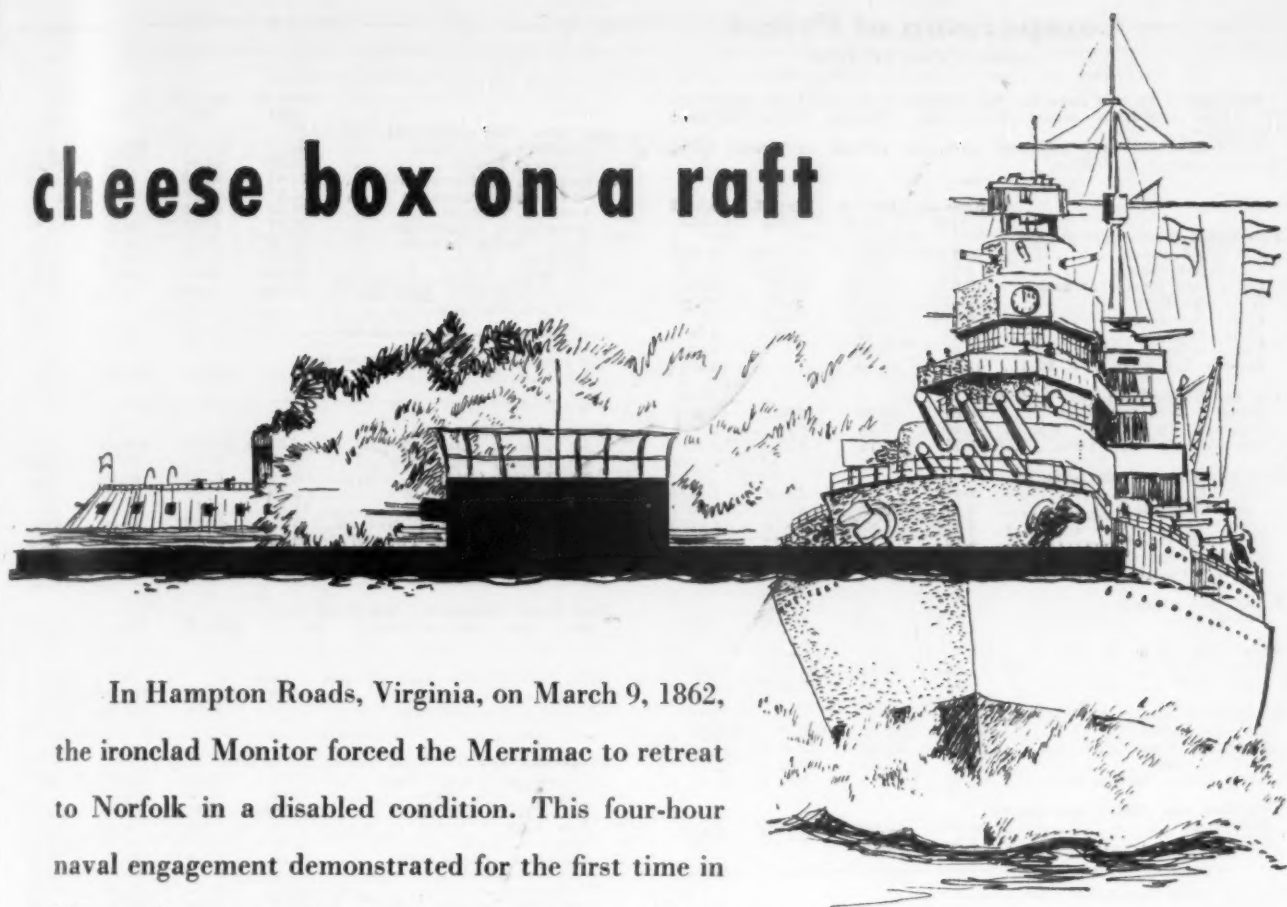
No. 1 hvy. melting	\$23.00 to \$25.00
No. 2 hvy. melting	19.00 to 21.00
No. 1 bundles	21.50
No. 2 bundles	17.00
No. 3 bundles	12.00
No. 1 cupola cast.	37.00
Mixed yard cast.	35.00

### Hamilton, Ont.

No. 1 hvy. melting	\$22.00
No. 2 hvy. melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bushelings	17.00
Bush., new fact prep'd	20.00
Bush., new fact unprep'd	16.00
Short steel turnings	12.00
Mixed bor. and turn.	11.00
Rails, remelting	21.00
Cast scrap	\$42.00 to 45.00



# cheese box on a raft



In Hampton Roads, Virginia, on March 9, 1862, the ironclad Monitor forced the Merrimac to retreat to Norfolk in a disabled condition. This four-hour naval engagement demonstrated for the first time in history the superiority of armored vessels—and put to an end the construction of wooden ships of war.

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# Comparison of Prices

(Effective June 22, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	June 22 1954	June 15 1954	May 25 1954	June 23 1953
<b>Flat-Rolled Steel: (per pound)</b>				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.925¢
Cold-rolled sheets	4.775	4.775	4.775	4.775
Galvanized sheets (10 ga.)	5.275	5.275	5.275	5.275
Hot-rolled strip	3.925	3.925	3.925	3.925
Cold-rolled strip	5.513	5.513	5.513	5.513
Plate	4.10	4.10	4.10	4.10
Plates wrought iron	9.30	9.30	9.30	9.00
Stain's C-R strip (No. 302)	41.50	41.50	41.50	41.50
<b>Tin and Terneplate: (per base box)</b>				
Tinplate (1.50 lb.) cokes	\$8.95	\$8.95	\$8.95	\$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. terns	7.75	7.75	7.75	7.75
<b>Bars and Shapes: (per pound)</b>				
Merchant bars	4.16¢	4.16¢	4.16¢	4.15¢
Cold finished bars	5.22	5.22	5.22	5.20
Alloy bars	4.875	4.875	4.875	4.875
Structural shapes	4.10	4.10	4.10	4.10
Stainless bars (No. 302)	35.50	35.50	35.50	35.50
Wrought iron bars	10.40	10.40	10.40	10.05
<b>Wire: (per pound)</b>				
Bright wire	5.525¢	5.525¢	5.525¢	5.525¢
<b>Rails: (per 100 lb.)</b>				
Heavy rails	\$4.325	\$4.325	\$4.325	\$4.325
Light rails	5.20	5.20	5.20	5.20
<b>Semi-finished Steel: (per net ton)</b>				
Re-rolling billets	\$62.00	\$62.00	\$62.00	\$62.00
Slabs, re-rolling	62.00	62.00	62.00	62.00
Forging billets	75.50	75.50	75.50	75.50
Alloy blooms, billets, slab	82.00	82.00	82.00	82.00
<b>Wire Rod and Skelp: (per pound)</b>				
Wire rods	4.525¢	4.525¢	4.525¢	4.525¢
Skelp	3.75	3.75	3.75	3.75
<b>Finished Steel Composite: (per pound)</b>				
Base price	4.634¢	4.634¢	4.634¢	4.632¢

## Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

## Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

## Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	June 22 1954	June 15 1954	May 25 1954	June 23 1953
<b>Pig Iron: (per gross ton)</b>				
Foundry, del'd Phila.	\$61.19	\$61.19	\$61.19	\$60.89
Foundry, Valley	56.50	56.50	56.50	55.00
Foundry, Southern, Cin'ti	60.43	60.43	60.43	58.93
Foundry, Birmingham	52.88	52.88	52.88	51.38
Foundry, Chicago	56.50	56.50	56.50	55.00
Basic del'd, Philadelphia	60.27	60.27	60.27	59.77
Basic, Valley furnace	56.00	56.00	56.00	54.50
Malleable, Chicago	56.50	56.50	56.50	55.00
Malleable, Valley	56.50	56.50	56.50	55.00
Ferromanganese, cents per lb.	10.00¢	10.00¢	10.00¢	10.00¢
‡ 76 pct Mn base.				

<b>Pig Iron Composite: (per gross ton)</b>				
Pig iron	\$56.59	\$56.59	\$56.59	\$55.26

<b>Scrap: (per gross ton)</b>				
No. 1 steel, Pittsburgh	\$29.50	\$29.50	\$30.50	\$43.50
No. 1 steel, Phila. area	22.75	22.75	22.75	42.50
No. 1 steel, Chicago	30.50	32.00	31.50	40.50
No. 1 bundles, Detroit	24.50	26.00	23.50	37.50
Low phos., Youngstown	31.50	31.50	31.50	46.50
No. 1 mach'y cast, Pittsburgh	43.50	43.50	43.50	49.50
No. 1 mach'y cast, Philadel'a	39.50	39.50	39.50	45.50
No. 1 mach'y cast, Chicago	40.50	41.00	42.00	45.50

<b>Steel Scrap Composite: (per gross ton)</b>				
No. 1 heavy melting scrap	\$27.58	\$28.08	\$28.25	\$42.17

<b>Coke, Connellsville: (per net ton at oven)</b>				
Furnace coke, prompt	\$14.38	\$14.38	\$14.38	\$14.75
Foundry coke, prompt	16.75	16.75	16.75	17.25

<b>Nonferrous Metals: (cents per pound to large buyers)</b>				
Copper, electrolytic, Conn.	30.00	30.00	30.00	29.875¢
Copper, Lake, Conn.	30.00	30.00	30.00	...
Tin, Straits, New York	98.375¢	98.375*	94.00	93.875
Zinc, East St. Louis	11.00	11.00	10.25	11.00
Lead, St. Louis	13.80	13.80*	13.80	13.80
Aluminum, virgin ingot	21.50	21.50	21.50	20.50
Nickel, electrolytic	63.08	63.08	63.08	63.08
Magnesium, ingot	27.75	27.75	27.75	27.00
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50
† Tentative. ‡ Average. * Revised.				

## PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

← To identify producers, see Key on p. 254 →

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem B3	58.00	58.50	59.00	59.50	...
Birmingham R3	52.38	52.88	...	...	...
Birmingham W9	52.38	52.88	...	...	...
Birmingham S5	52.38	52.88	...	...	...
Buffalo R3	56.00	56.50	57.00	...	...
Buffalo H1	56.00	56.50	57.00	...	...
Buffalo W6	56.00	56.50	57.00	...	...
Chicago I4	56.00	56.50	56.50	57.00	...
Cleveland A5	56.00	56.50	56.50	57.00	61.00
Cleveland R3	56.00	56.50	56.50	...	...
Dangerfield L3	52.50	52.50	52.50	...	...
Duluth I4	56.00	56.50	56.50	57.00	...
Erie I4	56.00	56.50	56.50	57.00	...
Everett M6	...	61.25	61.75	...	...
Fontana K1	62.00	62.50	...	...	...
Geneva, Utah C7	56.00	56.50	...	...	...
Granite City G2	57.90	58.40	58.90	...	...
Hubbard Y1	...	...	56.50	...	...
Minnequa C6	58.00	59.00	59.00	...	...
Monessen P6	56.00	...	...	...	...
Neville Is. P4	56.00	56.50	56.50	...	...
Pittsburgh U1	56.00	...	...	57.00	...
Sharpsville S3	56.00	56.50	56.50	57.00	...
Steelton B3	58.00	58.50	59.00	59.50	64.00
Swedeland A2	58.00	58.50	59.00	59.50	...
Toledo I4	56.00	56.50	56.50	57.00	...
Troy, N. Y. R3	58.00	58.50	59.00	59.50	64.00
Youngstown Y1	...	...	56.50	57.00	...
N. Tonawanda T1	...	56.50	57.00	...	...

**DIFFERENTIALS:** Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct., \$2 per ton for .85 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over.

**Silvery Iron:** Buffalo, H1, \$63.25; Jackson, J1, G1, \$67.00. Add \$1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add \$1 per ton for 0.75 pct. or more phosphorus. Add 75¢ for each 0.50 pct. manganese over 1.0 pct. Bessemer ferro-silicon prices are \$1 over comparable silvery iron.

## STAINLESS STEEL

Base price cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	476	430
Ingot, re-rolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	...	14.25
Slabs, billets, re-rolling	20.50	22.75	24.75	23.75	36.25	29.50	32.25	18.25	...	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75	45.75	51.25	30.00	30.50	30.50
Sheets	38.25	41.50	48.75	43.75	62.75	50.50	59.25	34.25	41.25	34.75
Strip, hot-rolled	29.75	32.00	36.75	34.25	53.25	41.00	46.50	26.25	...	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	62.75	50.50	59.25	34.25	41.25	34.75

## STAINLESS STEEL PRODUCING POINTS:

**Sheets:** Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W2, J2; Baltimore, El; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4.

**Strip:** Midland, Pa., C11; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leeburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, C5; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (.25¢ per lb higher) W1 (.25¢ per lb higher); New Bedford, Mass., R6.

**Bar:** Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, I4.

**Wire:** Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, C11; Bridgeville, U2.

**Structurals:** Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

**Plates:** Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., J2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15.

**Forged discs, die blocks, rings:** Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

**Forging billets:** Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11.

## IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

**STEEL  
PRICES**(Effective  
June 22, 1954)**BILLETS, BLOOMS,  
SLABS****PIL-  
ING****SHAPES  
STRUCTURALS****STRIP**

Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
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Bethlehem, Pa.			\$82.00 B3		4.15 B3	6.20 B3	4.15 B3					
Buffalo, N. Y.	\$62.00 B3	\$75.50 B3, R3	\$82.00 B3, R3	4.925 B3	4.15 B3	6.20 B3	4.15 B3	3.925 B3, R3	5.45 B3, R7	6.00 B3	8.425 B3	
Claymont, Del.												
Coatesville, Pa.												
Conshohocken, Pa.								4.05 A2		5.90 A2		
New Bedford, Mass.									6.00 R6			
Harrison, N. J.												12.00 C11
Johnstown, Pa.	\$62.00 B3	\$75.50 B3	\$82.00 B3		4.15 B3	6.20 B3						
Fairless, Pa.												
New Haven, Conn.									5.90 D1 6.20 A5			
Phoenixville, Pa.					3.80 P2		3.80 P2					
Sparrows Pt., Md.								3.925 B3	5.45 B3	6.00 B3	8.425 B3	
Wallingford, Conn.									5.90 W1			
Worcester, Mass.									6.30 A5			12.30 A5 12.45 N7
Alton, Ill.								4.10 L1				
Ashland, Ky.								3.925 A7				
Canton-Maxillion, Dover, Ohio			\$82.00 R3, T5									12.00 G4
Chicago, Ill.	\$62.00 U1	\$75.50 R3, U1, W8	\$82.00 U1, W8, R3	4.925 U1	4.10 U1, W8	6.175 U1, Y1	4.10 U1	3.925 A1, W8	5.70 A1	5.95 R3		6.40 W8
Cleveland, Ohio		\$75.50 R3							5.45 A5, J3		7.80 J3 8.15 A5	12.00 A5 12.15 N7
Detroit, Mich.			\$84.00 R5					4.075 G3 4.15 M2	5.60 D1, D2, G3, M2, P11	6.10 G3	7.90 D2 8.30 G3	
Duluth, Minn.												
Gary, Ind. Harbor, Indiana	\$62.00 U1	\$75.50 U1	\$82.00 U1, Y1	4.925 I3	4.10 I3, U1	6.175 U1, I3		3.925 I3, U1, Y1	5.70 I3	5.95 U1, I3 6.45 Y1		6.40 U1
Granite City, Ill.												
Indianapolis, Ind.									5.60 C5			
Manassas, Ohio												
Middletown, Ohio									5.45 A7			
Niles, Warren, Ohio Sharon, Pa.								3.925 S1	5.45 S1, T4	5.95 S1	7.65 S1	6.40 S1 12.00 S1
Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$62.00 U1, J3	\$75.50 J3, U1	\$82.00 U1, C11	4.925 U1	4.10 J3, U1	6.175 J3, U1	4.10 U1	3.925 A7, P6 3.95 S7 4.425 S9	5.45 B4, J3, S7		7.80 J3	6.40 S9 6.45 S7 12.00 S9 12.15 S7
Portsmouth, Ohio								3.925 P7				
Weirton, Wheeling, Follinsbee, W. Va.					4.10 W3			3.925 W3	5.45 F3, W3	5.95 W3	8.15 W3	
Youngstown, Ohio			\$82.20 Y1, C10		4.10 Y1	6.675 Y1		3.925 R3, U1, Y1	5.45 R3, Y1, C5	5.95 U1, R3 6.45 Y1	7.60 R3 8.30 Y1	6.40 U1 12.00 C5
Fontana, Cal.	\$70.00 K1	\$83.50 K1	\$101.00 K1		4.75 K1	6.825 K1	5.10 K1	4.70 K1	7.35 K1	7.05 K1		7.80 K1 13.65 K1
Geneva, Utah		\$75.50 C7			4.10 C7	6.175 C7						
Kansas City, Mo.					4.70 S2	6.775 S2		4.525 S2		6.55 S2		7.00 S2
Los Angeles, Torrance, Cal.		\$85.00 B2	\$102.00 B2		4.80 B2, C7	6.85 B2		4.675 B2, C7	7.50 C1			7.60 B2
Minnequa, Colo.					4.55 C6			5.025 C6				
San Francisco, Niles, Pittsburg, Cal.		\$85.00 B2			4.75 B2 4.91 P9	6.80 B2		4.675 B2, C7				
Seattle, Wash.		\$89.00 B2			4.85 B2	6.90 B2						
Atlanta, Ga.								4.125 A8				
Fairfield, Ala. City, Birmingham, Ala.	\$62.00 T2	\$75.50 T2			4.10 R3, T2	6.175 T2		3.925 R3, T2, C16		5.95 T2		
Houston, Tex.		\$83.50 S2	\$90.00 S2		4.50 S2			4.325 S2				6.80 S2



**STEEL  
PRICES**(Effective  
June 22, 1954)

	SHEETS										WIRE ROD	TINPLATE†		BLACK PLATE
	Hot-rolled 18 ga. & hvyr.	Cold- rolled	Galvanized 10 ga.	Enamel- ing 12 ga.	Long Tern 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled 19 ga.			Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Hollow Enamel- ing 29 ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	3.925 B3	4.775 B3			5.90 B3	7.225 B3			4.525 W6		† Special coated mfg. terne deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb deduct \$2.20 from 1.25-lb coke base box. * COKES: 1.50 lb add 25¢. ELECTRO: 0.50-lb add 25¢; 0.75-lb add 65¢; 1.00-lb add \$1.20.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conschocken, Pa.	3.975 A2				5.90 A2								
	Harriaburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.									4.525 B3				
	Fairless, Pa.	3.975 U1	4.825 U1			5.95 U1	7.275 U1					\$8.80 U1	\$7.50 U1	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	3.925 B3	4.775 B3	5.275 B3		5.90 B3	7.225 B3	8.075 B3		4.625 B3		\$8.80 B3	\$7.50 B3	
	Worcester, Mass.									4.825 A5				
MIDDLE WEST	Trenton, N. J.													
	Alton, Ill.									4.70 L1				
	Ashland, Ky.	3.925 A7		5.275 A7	5.175 A7									
	Canton-Massillon, Dover, Ohio			5.275 R1, R3					5.05 R1					
	Chicago, Joliet, Ill.	3.925 A1, W8				5.90 U1				4.525 A5, N4, R3				
	Sterling, Ill.									4.625 N4				
	Cleveland, Ohio	3.925 J3, R3	4.775 J3, R3		5.175 R3	5.90 J3, R3	7.225 J3, R3			4.525 A5				
	Detroit, Mich.	4.075 G3, M2	4.925 G3			6.05 G3	7.375 G3							
	Newport, Ky.	3.925 N5												
	Garr, Ind. Harbor, Indiana	3.925 J3, U1, Y1	4.775 J3, U1, Y1	5.275 U1, J3	5.175 J3, U1	5.675 U1	5.90 U1, J3 6.40 Y1	7.225 U1 7.725 Y1				\$8.70 J3, U1, Y1	\$7.40 J3, U1	6.10 U1, Y1
	Granite City, Ill.	4.125 G2	4.975 G2	5.475 G2	5.375 G2								\$7.60 G2	6.30 G2
	Kokomo, Ind.	4.025 C9		5.375 C9					5.025 C9	4.625 C9				
	Mansfield, Ohio					5.675 E2			5.05 E2					
	Middletown, Ohio		4.775 A7		5.175 A7	5.675 A7								
	Niles, Ohio	3.925 S1	5.80 N3	5.275 N3	6.525 N3	5.45 S1	5.90 S1						\$7.40 R3	
	Sharon, Pa.	5.175 N3			5.675 N3									
	Pittsburgh, Pa.	3.925 J3, U1, P6, A7	4.775 J3, U1, P6	5.275 U1	5.175 U1	5.90 J3, U1	7.225 J3, U1	7.925 U1		4.525 A5 4.725 P6		\$8.70 J3, U1	\$7.40 J3, U1	6.10 U1
	Butler, Pa.													
WEST	Portsmouth, Ohio	3.925 P7	4.775 P7							4.525 P7				
	Weirton, Wheeling, Follansbee, W. Va.	3.925 W3, W5	4.775 W3, W5, F3	5.275 W3, W5		5.675 W3, W5	5.90 W3	7.225 W3				\$8.70 W3, W5	\$7.40 W3, W5	6.10 F3, W5
	Youngstown, Ohio	3.925 R3, U1, Y1	4.775 R3, Y1		5.175 Y1	5.90 U1, R3 6.40 Y1	7.225 R3 7.725 Y1			4.525 Y1		\$8.70 R3		
	Fontana, Cal.	4.70 K1	5.875 K1			6.675 K1	8.275 K1			5.325 K1				
	Geneva, Utah	4.025 C7												
	Kansas City, Mo.								4.775 C6	4.865 S2				
	Los Angeles, Torrance, Cal.	4.625 C7		6.275 C7						5.325 B2				
SOUTH	Minnequa, Colo.									4.775 C6				
	San Francisco, Niles, Pittsburg, Cal.	4.625 C7	5.725 C7	6.025 C7						5.175 C7		\$9.45 C7	\$8.15 C7	
	Seattle, Wash.													
	Atlanta, Ga.													
SOUTH	Fairfield, Ala.	3.925 R3, T2	4.775 T2	5.275 R3, T2		5.90 T2				5.125 T2 5.225 R3	4.525 T2 R3	\$8.80 T2	\$7.50 T2	
	Alabama City, Ala.													
	Houston, Texas	4.325 S2								4.925 S2				

## IRON AGE

STEEL  
PRICES(Effective  
June 22, 1954)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	BARS						PLATES				WIRE
	Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Migr's. Bright
Bethlehem, Pa.				4.875 B3	6.325 B3	6.225 B3					
Buffalo, N. Y.	4.15 B3 4.18 R3	4.15 B3, R3	5.25 B5	4.875 B3, R3	6.325 B3, B5	6.225 B3	4.10 B3			6.25 B3	5.525 W6
Claymont, Del.							4.10 C4		5.55 C4		
Coatesville, Pa.							4.10 L4		5.55 L4		
Conschohocken, Pa.							4.10 A2	5.15 A2		6.25 A2	
Harrisburg, Pa.							3.85 C3	5.15 C3			
Hartford, Conn.			5.70 R3		6.775 R3						
Johnstown, Pa.	4.15 B3	4.15 B3		4.875 B3		6.225 B3	4.10 B3		5.55 B3	6.25 B3	5.525 B3
Fairless, Pa.	4.30 U1	4.30 U1		5.025 U1							
Newark, N. J.			5.65 W10		6.65 W10						
New Haven, Conn.											
Camden, N. J.			5.65 P10		6.50 P10						
Putnam, Conn.			5.75 W10								
Sparrows Pt., Md.		4.15 B3					4.10 B3		5.55 B3	6.25 B3	5.625 B3
Palmer, Worcester, Mansfield Mass.			5.75 B5 6.10 W11		6.775 B5						5.825 A5, W6
Readville, Mass.			5.75 C14								
Alton, Ill.	4.35 L1										5.70 L1
Ashland, Ky.							4.10 A7				
Canton-Massillon, Ohio			5.20 R2 5.24 R3	4.875 R3, T5	6.325 R2, R3, T5						
Chicago, Joliet, Ill.	4.15 U1, N4, W8 4.22 R3	4.15 R3, N4	5.20 A5, W10, W8, B5, L2	4.875 U1, W8, R3	6.325 A5, W8, W10, L2, R3, B5		4.10 U1, W8	5.15 U1	5.55 U1	6.25 U1	5.525 A1, R3, N4, W7
Cleveland, Ohio	4.21 R3	4.15 R3	5.20 A5, C13		6.325 A5, C13		4.10 J3, R3	5.15 J3		6.25 J3	5.525 A5, R3, C13
Detroit, Mich.	4.30 R5, G3		5.35 R5, P8 5.40 B5 5.45 P3	4.975 R5 5.025 G3	6.425 R5 6.475 P8 6.525 B5, P3	6.375 G3	4.25 G3			6.40 G3	
Duluth, Minn.											5.525 A5
Gary, Ind. Harbor, Crawfordsville	4.15 J3, U1, Y1	4.15 J3, U1, Y1	5.27 R3	4.875 J3, U1, Y1	6.325 R3, M5	6.225 U1, J3 6.725 Y1	4.10 J3, U1, Y1	5.15 J3	5.55 U1	6.25 U1, J3 6.75 Y1	5.625 M4
Granite City, Ill.							4.30 G2				
Kokomo, Ind.											5.625 C9
Sterling, Ill.	4.25 N4	4.25 N4									5.625 N4
Niles, Ohio Sharon, Pa.							4.10 S1		5.55 S1	6.25 S1	
Pittsburgh, Pa. Midland, Pa.	4.15 J3, U1 4.20 R3	4.15 J3, U1	5.20 A5, C8, J3, W10 5.26 R3	4.875 U1, C11	6.325 A5, C11, W10, C8	6.225 J3, U1	4.10 J3, U1	5.15 U1	5.55 U1	6.25 J3, U1	5.525 A5, J3, P6
Portsmouth, Ohio											5.525 P7
Weirton, Wheeling, Follansbee, W. Va.	4.15 W3						4.10 W3				
Youngstown, Ohio	4.15 U1, Y1 4.20 R3	4.15 R3, U1, Y1	5.20 Y1, F2	4.875 U1, Y1, C10	6.325 Y1, C10, F2	6.225 U1 6.725 Y1	4.10 R3, U1, Y1			6.75 Y1	5.525 Y1
Emeryville, Cal.	4.90 J5	4.90 J5									
Fontana, Cal.	4.85 K1	4.85 K1		5.925 K1		7.475 K1	4.75 K1		6.60 K1	6.95 K1	
Geneva, Utah							4.10 C7			6.25 C7	
Kansas City, Mo.	4.75 S2	4.75 S2		5.475 S2		6.825 S2					6.125 S2
Los Angeles, Torrance, Cal.	4.85 B2, C7	4.85 B2, C7	6.65 R3 6.96 R3	5.925 B2		6.925 B2					6.475 B2
Minneapolis, Colo.	4.60 C6	4.75 C6					4.95 C6				5.775 C6
Portland, Ore.	4.90 O2										
San Francisco, Niles, Pittsburg, Cal.	4.85 C7, P9 4.90 B2	4.85 C7, P9 4.90 B2				6.975 B2					6.475 C7
Seattle, Wash.	4.90 B2, N6	4.90 B2				6.975 B2	5.00 B2			7.15 B2	
Atlanta, Ga.	4.35 A8	4.35 A8									5.725 A8
Fairfield, Ala. City, Birmingham, Ala.	4.15 T2, C16 4.18 R3	4.15 R3, T2, C16				6.225 T2	4.10 R3, T2			6.25 T2	5.525 R3, T2
Houston, Ft. Worth, Lone Star, Tex.	4.55 S2	4.55 S2		5.275 S2			4.50 L3, S2				5.925 S2

# Steel Prices

(Effective June 22, 1954)

## Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago	G2 Granite City Steel Co., Granite City, Ill.	P8 Plymouth Steel Co., Detroit
A2 Alan Wood Steel Co., Conshohocken, Pa.	G3 Great Lakes Steel Corp., Detroit	P9 Pacific States Steel Co., Niles, Cal.
A3 Allegheny Ludlum Steel Corp., Pittsburgh	G4 Greer Steel Co., Dover, O.	P10 Precision Drawn Steel Co., Camden, N. J.
A4 American Cladmetals Co., Carnegie, Pa.	H1 Hanna Furnace Corp., Detroit	P11 Production Steel Strip Corp., Detroit
A5 American Steel & Wire Div., Cleveland	I2 Ingersoll Steel Div., Chicago	R1 Reeves Steel & Mfg. Co., Dover, O.
A6 Angell Nail & Chaplet Co., Cleveland	I3 Inland Steel Co., Chicago	R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
A7 Armco Steel Corp., Middletown, O.	I4 Interlake Iron Corp., Cleveland	R3 Republic Steel Corp., Cleveland
A8 Atlantic Steel Co., Atlanta, Ga.	J1 Jackson Iron & Steel Co., Jackson, O.	R4 Roebbing Sons Co., John A., Trenton, N. J.
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.	J2 Jessop Steel Corp., Washington, Pa.	R5 Rotary Electric Steel Co., Detroit
B2 Bethlehem Pacific Coast Steel Corp., San Francisco	J3 Jones & Laughlin Steel Corp., Pittsburgh	R6 Rodney Metals, Inc., New Bedford, Mass.
B3 Bethlehem Steel Co., Bethlehem, Pa.	J4 Joslyn Mfg. & Supply Co., Chicago	R7 Rome Strip Steel Co., Rome, N. Y.
B4 Blair Strip Steel Co., New Castle, Pa.	J5 Judson Steel Corp., Emeryville, Calif.	S1 Sharon Steel Corp., Sharon, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.	K1 Kaiser Steel Corp., Fontana, Cal.	S2 Sheffield Steel Corp., Kansas City
C1 Calstrip Steel Corp., Los Angeles	K2 Keystone Steel & Wire Co., Peoria	S3 Shenango Furnace Co., Pittsburgh
C2 Carpenter Steel Co., Reading, Pa.	K3 Koppers Co., Granite City, Ill.	S4 Simonds Saw & Steel Co., Fitchburg, Mass.
C3 Central Iron & Steel Co., Harrisburg, Pa.	L1 Laclede Steel Co., St. Louis	S5 Sloss Sheffield Steel & Iron Co., Birmingham
C4 Claymont Products Dept., Claymont, Del.	L2 La Salle Steel Co., Chicago	S6 Standard Forging Corp., Chicago
C5 Cold Metal Products Co., Youngstown, O.	L3 Lone Star Steel Co., Dallas	S7 Stanley Works, New Britain, Conn.
C6 Colorado Fuel & Iron Corp., Denver	L4 Lukens Steel Co., Coatesville, Pa.	S8 Superior Drawn Steel Co., Monaca, Pa.
C7 Columbia Geneva Steel Div., San Francisco	M1 Mahoning Valley Steel Co., Niles, O.	S9 Superior Steel Corp., Carnegie, Pa.
C8 Columbia Steel & Shafting Co., Pittsburgh	M2 McLouth Steel Corp., Detroit	S10 Sweet's Steel Co., Williamsport, Pa.
C9 Continental Steel Corp., Kokomo, Ind.	M3 Mercer Tube & Mfg. Co., Sharon, Pa.	T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
C10 Copperweld Steel Co., Pittsburgh, Pa.	M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.	T2 Tennessee Coal & Iron Div., Fairfield
C11 Crucible Steel Co. of America, New York	M5 Monarch Steel Co., Inc., Hammond, Ind.	T3 Tennessee Products & Chem. Corp., Nashville
C12 Cumberland Steel Co., Cumberland, Md.	M6 Mystic Iron Works, Everett, Mass.	T4 Thomas Strip Div., Warren, O.
C13 Cuyahoga Steel & Wire Co., Cleveland	N1 National Supply Co., Pittsburgh	T5 Timken Steel & Tube Div., Canton, O.
C14 Compressed Steel Shafting Co., Readville, Mass.	N2 National Tube Div., Pittsburgh	T6 Tremont Nail Co., Warcham, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.	N3 Niles Rolling Mill Div., Niles, O.	T7 Texas Steel Co., Fort Worth
C16 Connors Steel Div., Birmingham	N4 Northwestern Steel & Wire Co., Sterling, Ill.	U1 United States Steel Corp., Pittsburgh
D1 Detroit Steel Corp., Detroit	N5 Newport Steel Corp., Newport, Ky.	U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
D2 Detroit Tube & Steel Div., Detroit	N6 Northwest Steel Rolling Mills, Seattle	U3 Fred Ulbrich & Sons, Wallingford, Conn.
D3 Driver Harris Co., Harrison, N. J.	N7 Newman Crosby Steel Co., Pawtucket, R. I.	W1 Wallingford Steel Co., Wallingford, Conn.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.	O1 Oliver Iron & Steel Co., Pittsburgh	W2 Washington Steel Corp., Washington, Pa.
E1 Eastern Stainless Steel Corp., Baltimore	O2 Oregon Steel Mills, Portland	W3 Weirton Steel Co., Weirton, W. Va.
E2 Empire Steel Co., Mansfield, O.	P1 Page Steel & Wire Div., Monessen, Pa.	W4 Wheatland Tube Co., Wheatland, Pa.
F1 Firth Sterling, Inc., McKeesport, Pa.	P2 Phoenix Iron & Steel Co., Phoenixville, Pa.	W5 Wheeling Steel Corp., Wheeling, W. Va.
F2 Fitzsimmons Steel Corp., Youngstown	P3 Pilgrim Drawn Steel Div., Plymouth, Mich.	W6 Wickwire Spencer Steel Div., Buffalo
F3 Follansbee Steel Corp., Follansbee, W. Va.	P4 Pittsburgh Coke & Chemical Co., Pittsburgh	W7 Wilson Steel & Wire Co., Chicago
G1 Globe Iron Co., Jackson, O.	P5 Pittsburgh Screw & Bolt Co., Pittsburgh	W8 Wisconsin Steel Co., S. Chicago, Ill.
	P6 Pittsburgh Steel Co., Pittsburgh	W9 Woodward Iron Co., Woodward, Ala.
	P7 Portsmouth Div., Detroit Steel Corp., Detroit	W10 Wycoff Steel Co., Pittsburgh
		W11 Worcester Pressed Steel Co., Worcester, Mass.
		Y1 Youngstown Sheet & Tube Co., Youngstown

## PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about \$200 per net ton.

	BUTTWELD														SEAMLESS									
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2-3 In.		2 In.		2 1/2 In.		3 In.		3 1/2-4 In.			
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.		
STANDARD T. & C.																								
Sparrows Pt. B3	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0										
Youngtown R3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0										
Fontana K1	13.25	+2.0	16.25	1.0	18.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0										
Pittsburgh J3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5		
Alton, Ill. L1	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0										
Sharon M3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0										
Fairless N2	24.25		27.25		29.75		32.25		32.75		33.25		34.75											
Pittsburgh N1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5		
Wheeling W5	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0										
Wheatland W4	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0										
Youngtown Y1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5		
Indiana Harbor Y1	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0										
Lorain N2	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5		
EXTRA STRONG																								
PLAIN ENDS																								
Sparrows Pt. B3	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0										
Youngtown R3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0										
Fontana K1	16.75		20.75		22.75		23.25		23.75		24.25		24.75											
Pittsburgh J3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75		
Alton, Ill. L1	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0										
Sharon M3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0										
Pittsburgh N1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75		
Wheeling W5	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0										
Wheatland W4	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0										
Youngtown Y1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75		
Indiana Harbor Y1	28.75	14.0	32.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0										
Lorain N2	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75		

Galvanized discounts based on zinc, at 11¢ per lb. East St. Louis. For each 1¢ change in zinc, discounts may vary as follows: 1/2 in., 3/4 in., and 1 in., 1 pt.; 1 1/4 in., 1 1/2 in., 2 in., 3/4 pt.; 2 1/2 in., 3 in., 1/2 pt. Calculate discounts on even cents per lb. of zinc, i.e., if zinc is 16.51¢ to 17.50¢ per lb. use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢. Threads only butt-weld and seamless, 2 1/4 pts. higher discount. Plain ends, butt-weld and seamless, 3 in. and under, 4 1/2 pts. higher discount. Butt-weld jobbers' discount, 5 pct. East St. Louis zinc price now 11.00¢.



# Steel Prices

(Effective June 23, 1954)

To identify producers, see Key on preceding page.

## RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer U1	4.325	5.20	5.275				
So. Chicago R3				7.05			
Cleveland R3							
Enaley T2	4.325	5.20					
Fairfield T2		5.20		7.05		5.125	
Gary U1	4.325	5.20				5.125	
Ind. Harbor T3			5.275	7.05		5.125	
Johnstown B3		5.20					
Joliet U1		5.20	5.275				
Kansas City S2				7.05		11.00	
Lackawanna B3	4.325	5.20	5.275			5.125	
Lebanon B3				7.05	10.50	11.00	
Minnequa C6	4.325	5.70	5.275	7.05		5.125	11.00
Pittsburgh O1					10.50	11.00	
Pittsburgh P5					10.50	11.00	
Pittsburgh J3				7.05			
Pitt'g. Cal. C7					5.275		
Seattle B7				7.55	5.275	11.50	
Seaton B3	4.325		5.275			5.125	
Struthers Y1						5.275	
Torrance C7							
Youngstown R3				7.05			

## ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi- Processed	Fully Processed
Field.....		8.05	
Armature.....	8.15	8.40	8.90
Elect.....	8.75	9.00	9.50
Motor.....	9.75	10.00	10.50
Dynamo.....	10.65	10.90	11.40
Trans. 72.....	11.60	11.85	12.35
Trans. 65.....	12.15	Grain Oriented	
Trans. 58.....	12.65	Trans. 80.....	16.25
Trans. 52.....	13.65	Trans. 73.....	16.75

Producing points: Beech Bottom (W5); Brackenridge (A5); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N3); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3); Zanesville (A7).  
\* Coils 75¢ higher.

## CLAD STEEL

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa., L4	*32.7	
Washington, Pa., J2		
Claymont, Del., C4		
New Castle, Ind., J2		32.50
Nickel-carbon		
10 pct. Coatesville, Pa., L4	37.5	
Inconel-carbon		
10 pct., Coatesville, Pa., L4	46.10	
Monel-carbon		
10 pct. Coatesville, Pa., L4	38.90	

\* Includes annealing and pickling, sandblasting.

## MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails		Woven Wire		Fence 9-15 1/2 ga.		Single Loop Bale Ties		Galv. Barbed and Twisted Barbed Wire		Merch. Wire Ann'd		Merch. Wire * Galv.	
	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col	Col
Alabama City R3	131	140			149	153	6.675	7.075						
Aliquippa, Pa. J3	131	143				150	6.675	7.20						
Atlanta A8	133	145			151	158	6.775	7.30						
Bartonville K2	133	145			151	158	6.775	7.30						
Buffalo W6														
Chicago, Ill. N4	131	143			149	156	6.675	7.20						
Cleveland A6	137													
Cleveland A5							6.675							
Crawfordsville M4	133	145			151	153	6.775	7.325						
Donora, Pa. A5	131	140			149	153	6.675	7.075						
Duluth A5	131	140	145		149	153	6.675	7.075						
Fairfield, Ala. T2	131	140			149	153	6.675	7.075						
Galveston D4	139	148												
Houston S2	139	148				161	7.075	7.475						
Johnstown, Pa. B3	131	143	145		156	6.675	7.225							
Joliet, Ill. A5	131	140			149	153	6.675	7.075						
Kokomo, Ind. C9	133	142			151	155	6.775	7.175						
Los Angeles B2						7.625								
Kansas City S2	143	152			161	165	7.275	7.675						
Minnequa C6	136	148	150	154	162	6.925	7.325							
Monessen P6	131	145			157	6.675	7.225							
Moline, Ill. R3				145										
Pittsburgh, Cal. C7	150	163			173	173	7.625	8.025						
Portsmouth P7						6.675								
Rankin, Pa. A5	131	140			153	6.675	7.075							
So. Chicago R3	131	140	145	149	153	6.675	7.075							
S. San Francisco C6						173								
Sparrows Pt. B3	133				151	158	6.775	7.325						
Struthers, O. Y1						6.675	7.175							
Worcester A5	137					6.975								
Williamsport, Pa. S10	133			158										

Cut Nails, carloads, base \$8.00 per keg (less 20¢ for jobbers), at Conshohocken, Pa. (A7).

\* Alabama City and So. Chicago don't include zinc extra. Galvanized products computed with zinc at 11.0¢ per lb.

## WARE- HOUSES

Base price, f.o.b. dollars per 100 lb.

Cities	City Delivery Charge	Sheets		Strip		Plates		Shapes		Bars		Alloy Bars			
		Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled	Standard Structural	Hot-Rolled	Cold- Finished	Hot-Rolled A-4615 As rolled	Hot-Rolled A-4140 Annealed	Cold-Drawn A-4615 As rolled	Cold-Drawn A-4140 Annealed		
Baltimore.....	\$ .20	6.20	7.12	7.36- 7.78	7.00	.....	6.85	6.98	6.86	8.17					
Birmingham.....	.15	6.10	7.00	8.00 <sup>4</sup>	6.30	.....	6.35	6.35	6.15	8.90					
Boston.....	.20	6.89	7.53- 7.83	9.18	7.13	9.35 <sup>2</sup>	7.13	7.06	6.87	8.35	12.40	11.94- 12.13	14.65	14.55- 14.58	
Buffalo.....	.25	6.11	7.10	8.65	6.50	.....	6.45	6.49	6.27	7.65		11.97	14.45	14.30	
Chicago.....	.20	6.18	7.12	7.95	6.42	.....	6.33	6.46	6.28	7.30		11.60		14.05	
Cincinnati.....	.20	6.30	7.11	8.00	6.66	.....	6.62	6.93	6.52	7.60		11.85		14.30	
Cleveland.....	.20	6.18	7.12	8.25	6.58	.....	6.50	6.79	6.34	7.40	12.04	11.74	14.29	14.19	
Denver.....		7.95	8.85	10.45- 10.47	8.20	9.55	7.95	7.95	8.05	9.05				15.75	
Detroit.....	.20	6.38	7.29	8.22	6.69	8.36	6.80	6.91	6.56	7.60	12.27	11.97	14.52	13.45- 14.42	
Houston.....	.20	7.15	7.60	9.23	7.45	.....	7.20	7.35	7.45	9.30		12.80			
Kansas City.....	.20	6.85			7.09	.....	7.00	7.13	6.95	8.07					
Los Angeles.....	.20	7.25	9.00	8.85- 9.50	7.55	.....	7.20	7.35	7.15	9.75		12.90		15.90	
Memphis.....	.10	6.79	7.69		6.90	.....	7.01	7.09	6.88	7.89					
Milwaukee.....	.20	6.35	7.29	8.12	6.59	.....	6.50	6.63	6.45	7.57		11.77		14.22	
New Orleans.....	.15	6.51	7.41		6.63	.....	6.73	6.81	6.60	8.37					
New York.....	.30	6.78	7.52- 7.75	8.37- 8.41 <sup>7</sup>	7.16	9.15 <sup>8</sup>	6.99	6.90	7.06	8.43	12.29	11.99	14.54	14.44	
Norfolk.....	.20	6.90			7.00	.....	7.00	7.00	7.00	8.50					
Philadelphia.....	.25	6.35	7.13	7.87	7.02	.....	6.63	6.67	6.87	8.19		11.75		14.19	
Pittsburgh.....	.20	6.18	7.12	8.00	6.55	.....	6.33	6.46	6.28	7.65		11.60		14.05	
Portland.....	.10	7.40	8.45	9.05	7.65	.....	7.25	7.25	7.35	10.65					
Salt Lake City.....	.20	8.60	10.50	10.50 <sup>3</sup>	9.25	.....	8.10	8.25	9.20	11.25					
San Francisco.....	.20	7.35	8.70	8.95- 9.45	7.60	.....	7.20	7.25	7.15	9.75		12.90		15.90	
Seattle.....	.20	7.95	9.30- 9.60	9.60	7.80	.....	7.40	7.30	7.40	10.45		13.15		15.60	
St. Louis.....	.20	8.15	9.50	9.80	8.00	.....	7.60	7.50	7.60	10.65					
St. Paul.....	.15	6.48	7.42	8.25	6.72	7.70- 8.53	6.73	6.86	6.58	7.70	12.20	11.90	14.45	14.30- 14.35	

Base Quantities (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.  
Exceptions: (1) 500 to 1499 lb. (2) 20,000 lb or over. (3) 450 to 1499 lb. (4) 600 to 999 lb. (5) 1000 lb or over. (6) 400 to 1499 lb. (7) 1500 to 3499 lb. (8) 2000 to 5999 lb.

## C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26- 0.40	0.41- 0.60	0.61- 0.80	0.81- 1.05	1.06- 1.35
Bridgeport, Conn. S7*	5.75	7.65	8.60	10.55	12.85
Carnegie, Pa. S9		7.65	8.60	10.55	12.85
Cleveland A5	5.45	7.65	8.60	10.55	12.85
Detroit D1	5.65	7.85	8.80	10.55	
Detroit D2	5.60	7.85	8.80		
Harrison, N. J. C11		6.90	8.90	10.85	13.15
Indianapolis C5	5.60	7.80	8.60	10.55	
New Castle, Pa. B4	5.80	8.00	8.60		
New Haven, Conn. D1	5.90	7.95	8.90	10.85	
Riverdale, Ill. A1	5.70	7.80	8.75	10.70	13.00
Buffalo, N. Y. R7	5.45	7.65	8.60	10.55	12.85
Sharon, Pa. S1	5.45	7.65	8.60	10.55	12.85
Trenton R4		7.95	8.90	10.85	13.15
Wallingford W1	6.20	7.95	8.90	10.85	13.15
Warren, Ohio T4	5.45	7.65	8.60	10.55	12.85
Weirton, W. Va. W3	5.45	7.65	8.60	10.55	12.85
Worcester, Mass. A5	6.30	7.95	8.90	10.85	13.15
Youngstown C3	5.45	7.65	8.60	10.55	

\* Sold on Pittsburgh base.

## BOILER TUBES

\$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld	
	OD- In.	B.W. Ga.	H.R.	C.D.	H.R.	C.D.
Babcock & Wilcox...	2	13	27.34	32.98	26.51	31.98
	2½	12	36.82	44.41	35.70	43.07
	3	12	42.52	51.28	41.23	49.73
	3½	11	49.63	59.87	48.13	58.06
	4	10	65.91	79.50	63.92	77.10
National Tube.....	2	13	.....	32.98	26.51	.....
	2½	12	36.82	44.41	35.70	.....
	3	12	42.52	51.28	41.23	.....
	3½	11	49.63	59.87	48.13	.....
	4	10	65.91	79.50	63.92	.....
Pittsburgh Steel...	2	13	27.34	32.98	.....	.....
	2½	12	36.82	44.41	.....	.....
	3	12	42.52	51.28	.....	.....
	3½	11	49.63	59.87	.....	.....
	4	10	65.91	79.50	.....	.....

## Miscellaneous Prices

(Effective June 22, 1954)

### TOOL STEEL

F.o.b. Mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$1.48
18	4	1	—	5	2.16
18	4	2	—	—	1.64
1.5	4	1.5	8	—	.895
6	4	2	6	—	1.005
High-carbon chromium					.70
Oil hardened manganese					.39
Special carbon					.355
Extra carbon					.30
Regular carbon					.25

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

### CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	\$111.80 to \$115.30
6 to 24-in., del'd N. Y.	115.00 to 116.00
6 to 24-in., Birmingham	98.00 to 102.50
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less	\$129.50 to \$131.50
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

### LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective July 1, 1953, to end of 1954 season.

	Gross Ton
Openhearth lump	\$11.15
Old range, bessemer	10.30
Old range, nonbessemer	10.15
Mesabi, bessemer	10.05
Mesabi, nonbessemer	9.90
High phosphorus	9.90

Prices based on upper Lakes rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.

### COKE

	Net-Ton
Furnace, beehive (f.o.b. oven)	\$14.25 to \$14.50
Connellsville, Pa.	
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	\$16.50 to \$17.00
Foundry, oven coke	
Buffalo, del'd	\$28.03
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.00
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	22.65
Lone Star, Tex., f.o.b.	18.50

### ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed

GRAPHITE			CARBON		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	20.50	40	100, 110	8.95
20	72	20.00	35	110	8.95
12 to 18	72	20.50	30	110	8.95
7 to 10	60	21.00	24	72 to 84	9.10
6	60	23.25	20	90	8.95
4	40	26.00	17	72	9.10
3	40	27.25	14	72	9.50
2½	30	28.00	10, 12	90	10.30
2	24	43.50	8	60	10.55

### BOLTS, NUTS, RIVETS, SCREWS

#### Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

#### Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List		
	Less Keg	K.	Less Keg
	Reg.	Hvy.	
½ in. & smaller	+2	15	+2
9/16 in. & ½ in.	+7	11	+32* +10*
¾ in. to 1½ in.			
inclusive	+8	10	+27** +6**
1½ in. & larger	+9	9	+27
9/16 to ¾ in.			
** ¾ to 1½ in.			

#### Nuts, Hot Pressed—Hexagon

½ in. & smaller	11	26	3	23
9/16 in. & ½ in.	2	18	+20	net
¾ in. to 1½ in.				
inclusive	+6	12	+25	+4
1½ in. & larger	+8	10	+25	+4

#### Nuts, Cold Punched—Hexagon

½ in. & smaller	11	26	3	23
9/16 in. & ½ in.	9	24	+2	15
¾ in. to 1½ in.				
inclusive	+1	16	+9	9
1½ in. & larger	+16	3	+20	net

#### Nuts, Semi-Finished—Hexagon

½ in. & smaller	23	36	14	28
9/16 in. & ½ in.	18	32	4	20
¾ in. to 1½ in.				
inclusive	8	23	+8	10
1½ in. & larger	+14	5	+20	net
	Light			
7/16 in. & smaller	33	43		
½ in. thru ¾ in.	26	37		
¾ in. to 1½ in.				
inclusive	18	30		

#### Stove Bolts

	Pct Off List
Packaged, steel, plain finished	44½—10
Packaged, plain finish	25½—10
Bulk, plain finish**	59*

\* Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

\*\*Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

#### Rivets

	Base per 100 lb
½ in. & larger	\$8.90
7/16 in. and smaller	30

#### Cap and Set Screws

	Pct Off List
(In bulk)	
Hexagon head cap screws, coarse or fine thread, ½ in. thru ¾ in. x 6 in., SAE 1020, bright	40
¾ in. thru 1 in. up to & including 6 in.	26
¾ in. thru ¾ in. x 6 in. & shorter	
high C double heat treat	43
¾ in. thru 1 in. up to & including 6 in.	33
Milled studs	17
Flat head cap screws, listed sizes	12
Fillister head cap, listed sizes	7
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	37

#### Machine and Carriage Bolts

	Pct Off List		
	Less Case	C.	
½ in. & smaller x 6 in. & shorter	4	20	
9/16 in. & ½ in. x 6 in. & shorter	5	21	
¾ in. & larger x 6 in. & shorter	3	19	
All diam. longer than 6 in.	+4	13	
Lag, all diam. x 6 in. & shorter	12	27	
Lag, all diam. longer than 6 in.	8	23	
Plow bolts	30		

### REFRACTORIES

#### Fire Clay Brick

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$109.00
No. 1 Ohio	102.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	102.00
No. 2 Ohio	82.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)	16.00

#### Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$115.00
Childs, Hays, Pa.	120.00
Chicago District	125.00
Western Utah	131.00
California	128.00

#### Super Duty

Hays, Pa., Athens, Tex., Windham	123.00
Curtner, Calif.	160.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	19.00
Silica cement, net ton, bulk, Hays, Pa.	21.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	20.00
Silica cement, net ton, bulk, Utah and Calif.	28.50

#### Chrome Brick

	Per net ton
Standard chemically bonded Balt.	\$86.00
Standard chemically bonded, Curtner, Calif.	96.25
Burned, Balt.	80.00

#### Magnesite Brick

Standard Baltimore	\$109.00
Chemically bonded, Baltimore	97.50

#### Grain Magnesite

	St. ¾-in. grains
Domestic, f.o.b. Baltimore	
in bulk fines removed	\$64.40
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	
in bulk	38.00
in sacks	43.75

#### Dead Burned Dolomite

	Per net ton
F.o.b. bulk, producing points in: Pa., W. Va., Ohio	\$14.50
Midwest	14.00
Missouri Valley	13.65

### FLUORSPAR

Washed gravel, f.o.b. Rosiclare, Ill.	
Price, net ton; Effective CaF <sub>2</sub> content	
72½%	\$44.00
70% or more	42.50
60% or less	38.00

### METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f.	
New York, ocean bags	11.25¢
Canadian sponge iron,	
Del'd in East	12.0¢
F.o.b. Iberville, P.Q.	10.5¢
Domestic sponge iron, 98+% Fe, carload lots	18.0¢
Electrolytic iron, annealed, 99.5+% Fe	38.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	53.5¢
Hydrogen reduced iron minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe	83.0¢ to \$1.48
Aluminum	\$1.5¢
Brass, 10 ton lots	29.50¢ to 36.50¢
Copper, electrolytic	43.50¢
Copper, reduced	43.50¢
Cadmium, 100-199 lb 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd.	\$3.80
Lead	21.00¢
Manganese	57.0¢
Molybdenum, 99%	\$3.75
Nickel, unannealed	89.50¢
Nickel, annealed	96.50¢
Nickel, spherical, unannealed	91.50¢
Silicon	43.50¢
Solder powder, 7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	91.0¢
Stainless steel, 316	\$1.10
Tin	14.04¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.65
Zinc, 10 ton lots	17.5¢ to 25.0¢

# Morgoil Adopts Aluminum Alloy

**IN 1935**, Morgan Construction Company, ever on the alert for improvements in roll neck bearings, was a pioneer in the use of cadmium nickel alloys to replace babbitt as the bearing metal in MORGGOIL Bearings.

World War II interrupted our research program but **IN 1946** we turned our attention to aluminum alloy bearing metals. For six years we carried on an extensive investigation in co-operation with the Research and Development Division of the Aluminum Company of America. Aluminum alloy bushings were tested in

MORGGOIL Bearings on all types of 2-high and 4-high mills in the plants of many of our customers and have definitely proved their superiority under the most grueling of operating conditions. **IN 1952** our production of bushings was changed to the aluminum alloy type. We are confident that this marked another important milestone in the development of the most rugged, most dependable and most economical roll neck bearing — MORGGOIL.

**MORGAN CONSTRUCTION CO.**  
**WORCESTER, MASSACHUSETTS**

ROLLING MILLS - MORGGOIL BEARINGS  
WIRE MILLS - GAS PRODUCERS - AIR EJECTORS  
REGENERATIVE FURNACE CONTROL

English Representative: International Construction Company, Ltd,  
56 Kingsway, London, W.C. 2, England

MB-25

# MORGGOIL

## ROLL NECK BEARINGS



Saves  $2\frac{1}{2}$ ¢ a square foot  
on paint costs, boosts  
production 40% with this  
Special Steel



Here's how one manufacturer boosted production and saved money—including  $2\frac{1}{2}$  cents a square foot on paint cost. He changed over from regular cold-rolled steel to Armco Cold-Rolled PAINTGRIP, a cold-rolled sheet with a mill-applied phosphate coating over an electrolytic flash of zinc.

### Saves on Cleaning Costs

Armco Cold-Rolled PAINTGRIP is shipped dry; cold-rolled steel was shipped oiled. Therefore, Cold-Rolled PAINTGRIP is much easier to clean in preparation for painting.

### Eliminates Primer

Armco Cold-Rolled PAINTGRIP eliminated the necessity of a primer coat, formerly required for both sides of the panel. Figuring paint coverage at 200 square feet a gallon, the primer cost 2 cents a square foot per side or 4 cents a square foot for both sides. The additional cost of Armco Cold-Rolled PAINTGRIP is about  $1\frac{1}{2}$  cents a square foot for 20-gage material. Yet by eliminating the primer cost of 4 cents per square foot, *there is a net saving of  $2\frac{1}{2}$  cents a square foot.*

### Increased Production, Too

The manufacturer has limited painting capacity. By eliminating the primer coat, he estimated 40 to 50 per cent greater production with no increase in facilities. This made possible a large operational saving.

### Holds and Preserves Paint

Tests show that paint lasts several times longer on Armco Cold-Rolled PAINTGRIP than on regular cold-rolled steel. There is no premature flaking or peeling because the paint-holding surface also *helps preserve paint.* Armco Cold-Rolled PAINTGRIP is recommended for flat or drawn parts where long paint life is essential and where an extra-smooth finish is desirable.

For complete information write for the booklet, "Armco Cold-Rolled PAINTGRIP."



## Armco Steel Corporation

4174 Curtis Street, Middletown, Ohio  
Export: The Armco International Corporation

# LANDMACO

## Diameter Threads—

GROUND WAYS • WIDE SPEED RANGE  
MORE GRIPPING POWER • 6" CAPACITY

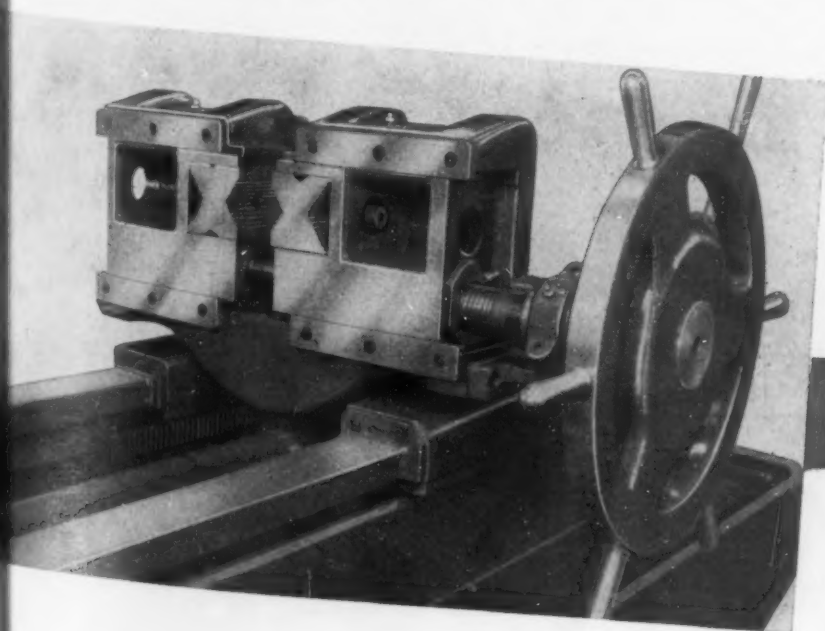
• A new LANDMACO Threading Machine with many improvements and new design features has been developed for heavy-duty precision threading on large diameter work. The first installation of this new LANDMACO is shown threading "Unbrako" Screw Products of TS4140 steel at the Standard Pressed Steel Company, Jenkintown, Pa. 1 1/2" diameter 12 pitch UN threads are being cut 2 29/32" long to a Class 3 fit.

The carriage front, based on a new principle, assures proper work alignment under gripping pressure and gives 60% more gripping efficiency. Heavy hardened and ground rectangular ways firmly guide and support the carriage.

A single gear shift lever is provided for a rapid speed change of 25% for any given spindle speed as determined by the speed change gears in use. Three pairs

of speed change gears provide twelve spindle speeds ranging from 9 to 152 revolutions per minute.

This machine is equipped with either the 4" Standard Rotary Head or the new 6" (6-chaser) Lanco Head. It will cut bolt threads from 1 1/2" to 6 5/8" in diameter, and pipe threads from 1" to 6" in diameter. Maximum thread length is 29" with leadscrew and 30" without leadscrew.

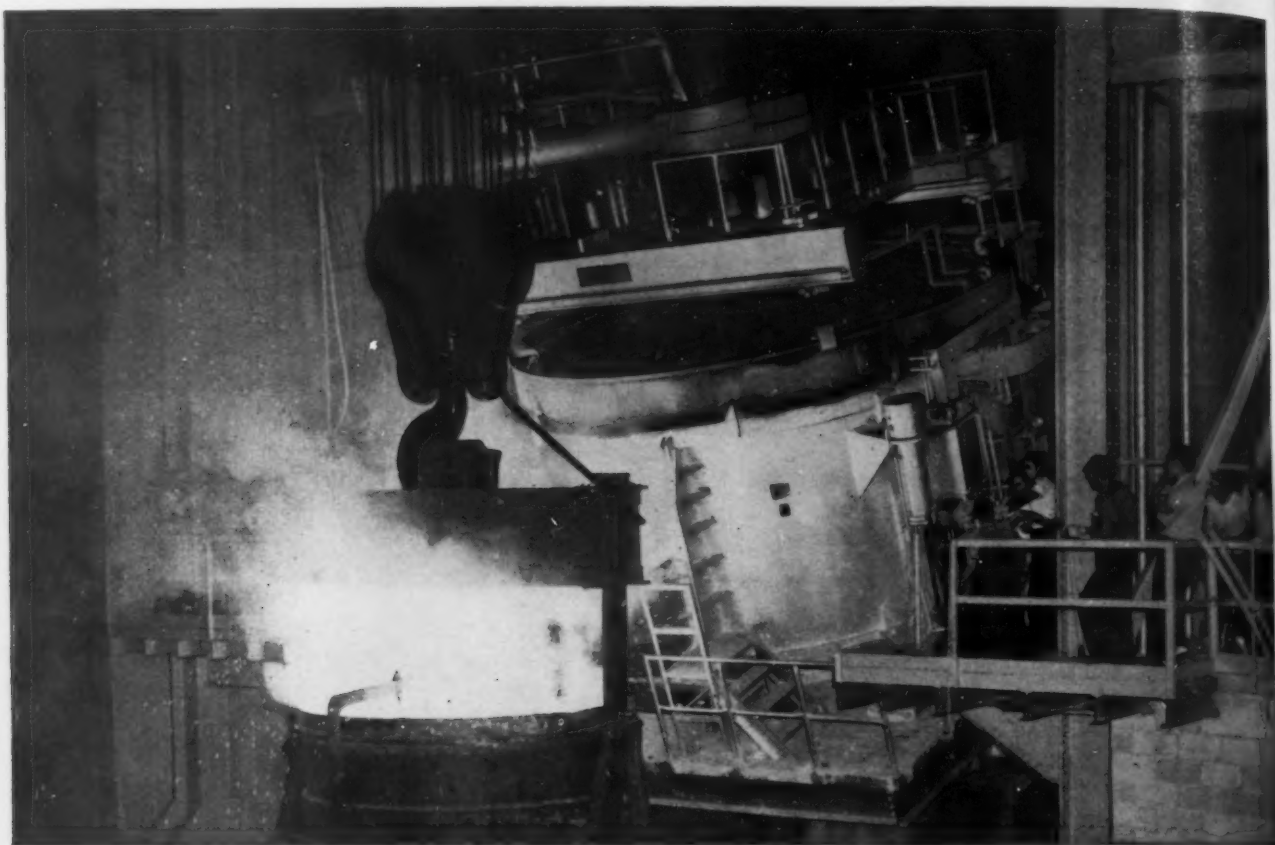


This machine is also available in a Double-Spindle model with a 7 1/2" carriage travel for pipe and nipple threading. For more information on the 32C and 48C Landmaco Threading Machines, write for Bulletin H-45.



WAYNESBORO  
PENNSYLVANIA

GENERATING EQUIPMENT



## Atlantic Steel's 75-ton baby breaks records for 2nd birthday

On May 13th Atlantic Steel Company in Atlanta celebrated the 2nd birthday of their 75-ton Lectromelt\* Furnace. Look at how they have increased its production with experience...

RECORD HEATS . . .	Feb. 15, 1953—84 tons for 41 ingots
	Feb. 8, 1954—88.15 tons for 43 ingots
DAILY RECORD . . .	March 7, 1953—460.3 tons
	Nov. 5, 1953—473 tons
WEEKLY RECORD . .	April 19-25, 1953—16 tons/hour for 35 heats averaging 76.7 tons/heat and totaling 2,684 tons
	Nov. 1-7, 1953—16½ tons/hour for 39 heats averaging 77.7 tons/heat and totaling 3,031 tons
MONTHLY RECORD . .	March 1953—10,890 tons
	March 1954—11,894 tons

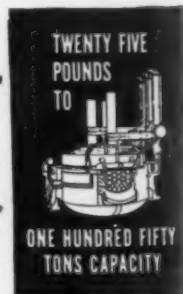
According to Atlantic they are constantly obtaining more consistent, higher quality, and are planning to let the Lectromelt carry their major production load, firing up their open hearths only as required.

Write for Bulletin #9 describing Lectromelt melting furnaces and components. Pittsburgh Lectromelt Furnace Corporation, 312 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in...GERMANY: Friedrich Kocks GMBH, Dusseldorf...ENGLAND: Birlec, Ltd., Birmingham  
...FRANCE: Stein et Roubaix, Paris...BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege...SPAIN:  
General Electrica Espanola, Bilbao...ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

\*REG. U. S. PAT. OFF.

WHEN YOU MELT... **MOORE RAPID**  
*Lectromelt*





*Allis-Chalmers Equipment for Steel Mill Duty at...*

# Fairless Works

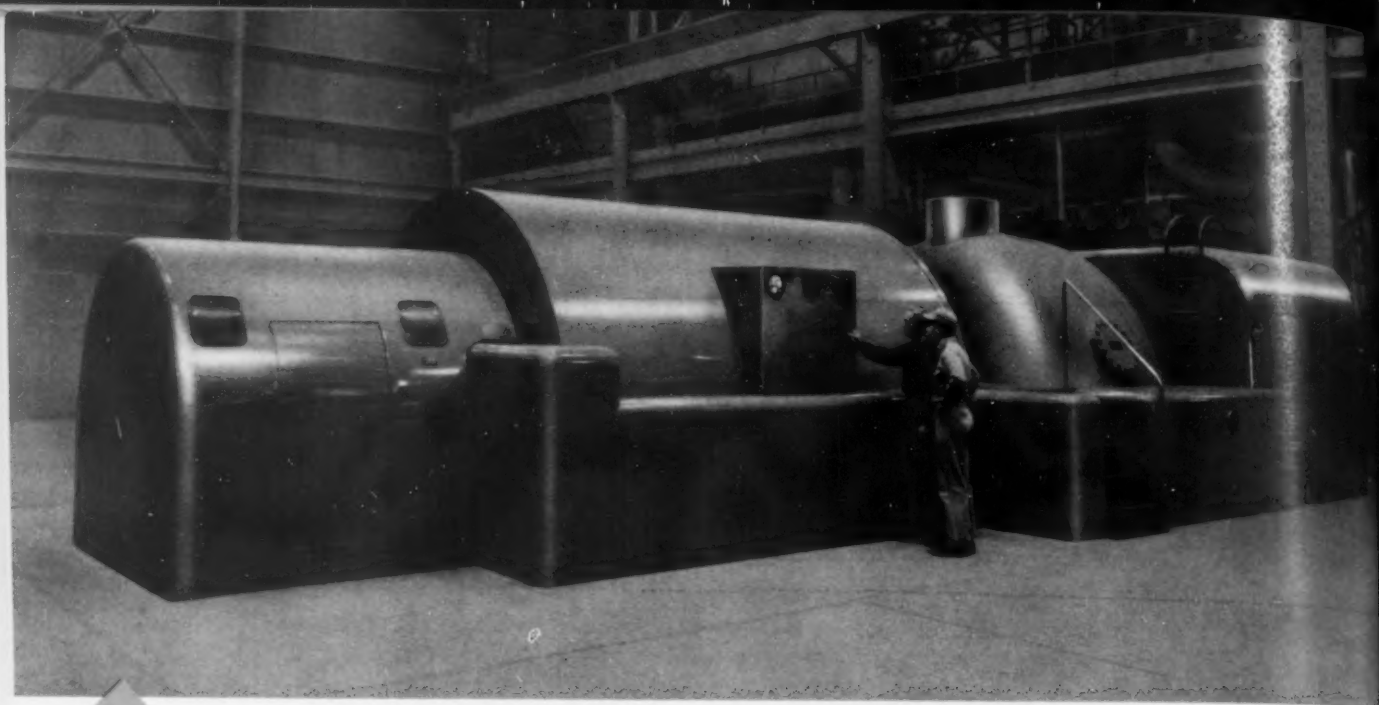


A-4307

# ALLIS-CHALMERS

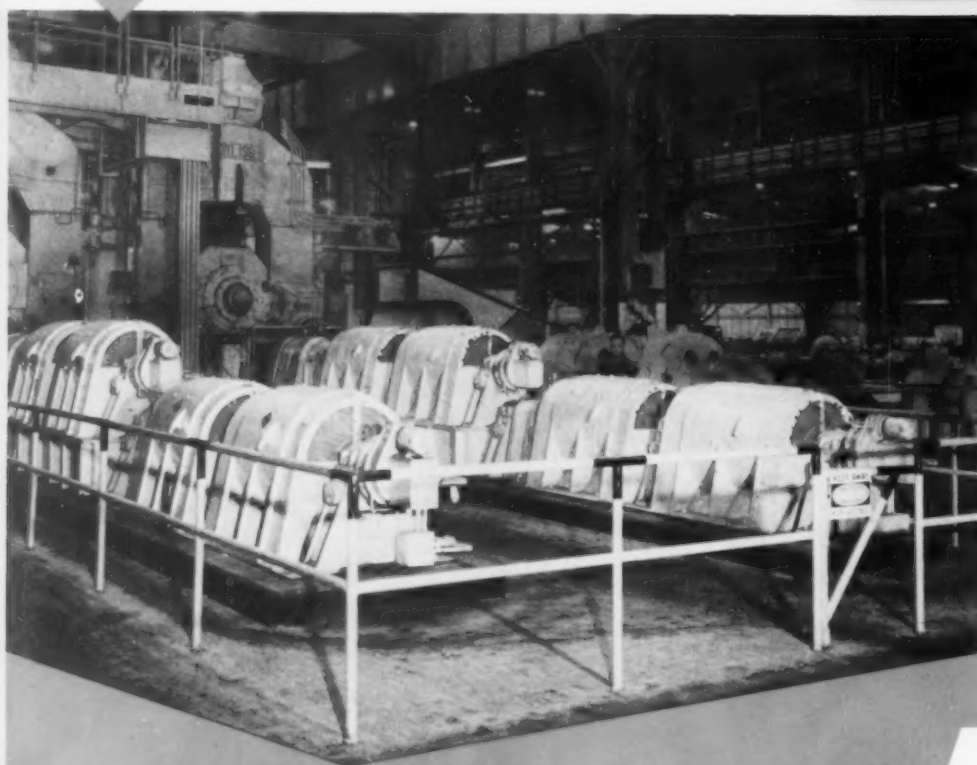
MILWAUKEE 1, WISCONSIN





**33,000 kw of steam-electric power** for Fairless. Turbine features include accessibility of stop and inlet valves, centralized operating controls, self-contained and automatic steam-sealed gland system, above-the-floor oil piping and effective control of horizontal and vertical thermal movements. The generator offers simplified hydrogen seals and control, spiral stator ventilation, flexible core mounting, and "walk-in" exciter housing.

**Double-armature twin drives power** this two-stand tin temper mill. Driving the No. 1 stand at left are four 150-hp dc armatures. Four 200-hp armatures comprise the No. 2 stand drive at right.



**Another** Allis-Chalmers first . . . voltage, current and tension regulation of the two-stand tin temper mill is provided by magnetic amplifiers which offer the most modern refinements to the control circuits.

# ALLIS

# Serving Fairless Works

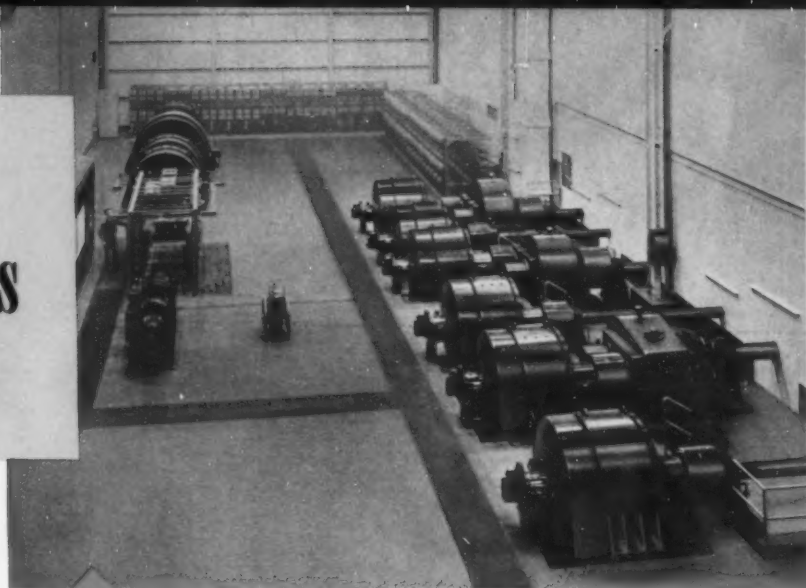
U.S. Steel Corporation's new integrated steel plant in the Delaware Valley, engineered for modern mill operations

... produces its own coke, iron and steel as well as finished steel ... is one of the largest plants of its kind in the world.

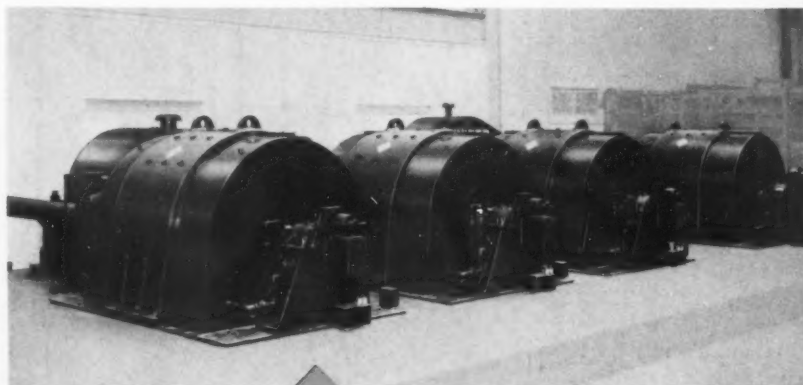
Again, as in other important mills of this vital industry, Allis-Chalmers was called upon to furnish a wide variety of equipment designed for steel mill duty.

Rolling steel requires tremendous power, a part of which is produced by an Allis-Chalmers 33,000-kw turbine generator unit. All 250-volt direct current for material handling ... from ore to finished steel ... is supplied by A-C rectifier units totaling 25,000 kw and located throughout the plant for maximum efficiency. Important rolling operations for billet mills, hot strip mill, and the two-stand tin temper mill are accomplished with controls, motors and generators designed and built by Allis-Chalmers.

For specific information on controls, drives and other electrical equipment to meet the needs of your expansion or conversion program, contact the nearby A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

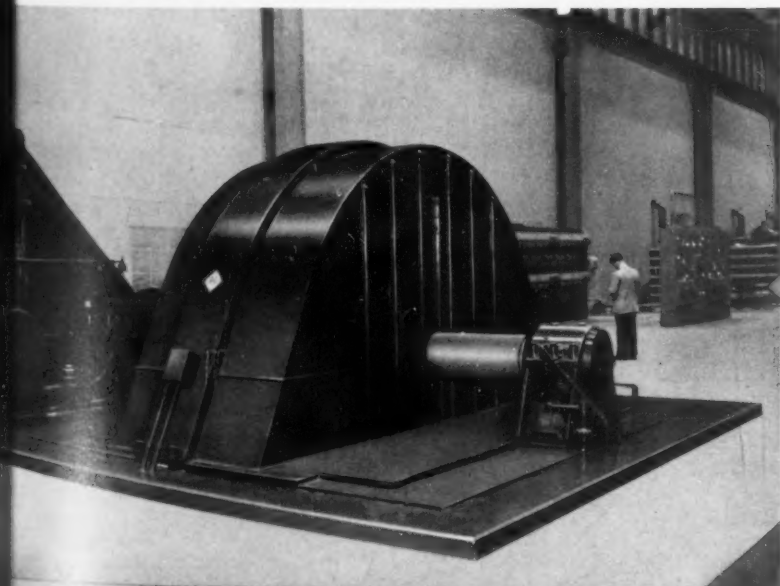


**Allis-Chalmers controls, motor-generator sets, and drive motors for the 30-in. billet mill.** Left background shows the 8000-kw m-g unit powered by an 11,200-hp synchronous motor, variable voltage control panel, and a 3-unit 180-kw exciter m-g set. The six drive motors are rated 1750 hp, 300/600 rpm, 600 volts dc.



**Four 1250-hp, 400/800-rpm, 600-volt dc motors driving four stands in the 21-in. continuous billet mill.** Variable voltage controls, 4000-kw synchronous m-g set, and a 130-kw exciter m-g set for this mill were also furnished by Allis-Chalmers.

**One of four universal roughing stand drives in the 80-inch hot strip mill.** Operating in conjunction with the 3500-hp broadside wound rotor motor shown on the cover, these four 6000-hp synchronous motors provide power for reducing large slabs. Other A-C motors in this mill include a 2000-hp synchronous scale breaking motor and two 500-hp wound rotor motors for a vertical edger.

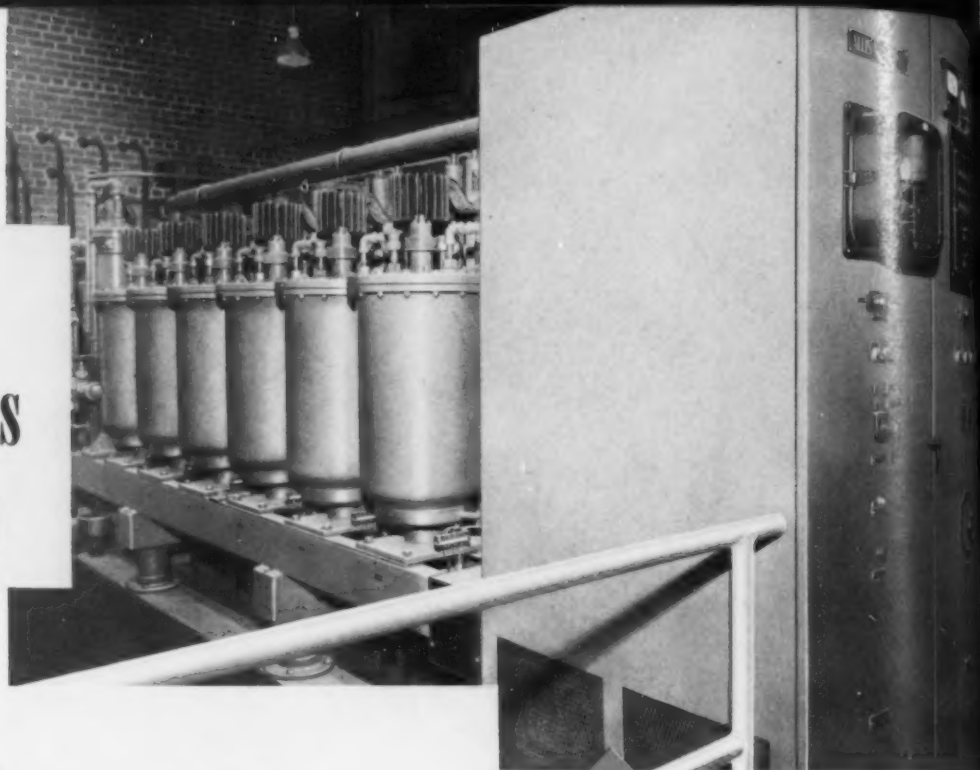


# CHALMERS

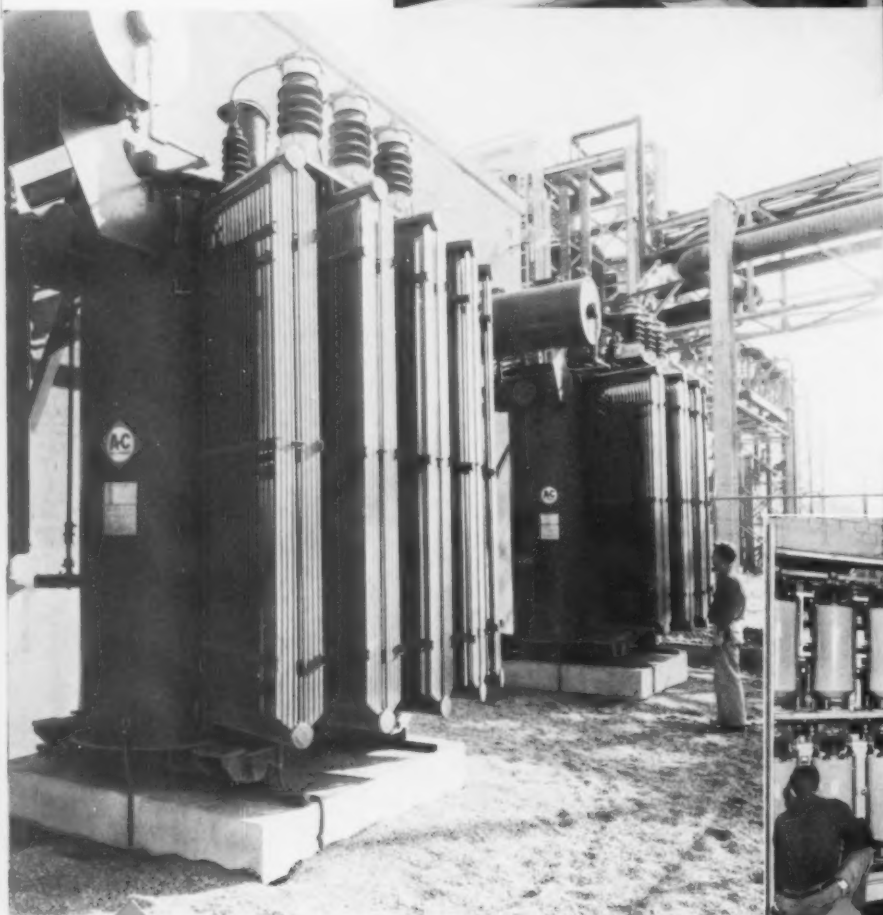




*Serving*  
**Fairless  
Works**



**One of two 1500-kw, 250-volt** rectifiers supplying direct current to cranes, pig casting machines, bailer, slag cars, and stock house equipment in Open Hearth Furnace area. Each unit substation is designed for a three-phase, 13,800-volt, 60-cycle supply and is suitable for starting and stopping by manual or remote control.



**Outdoor type main transformers** for two 1500-kw, 250-volt rectifier units in the Open Hearth area. These transformers are oil insulated self-cooled, with built-in interphase reactors, and are provided with ground level tap changers for ease of operation, and broad flanged wheels for use on rails or flat surfaces.



**Two 500-kw, 250-volt metal-clad rectifier units** supplying dc service to coke plant pusher and coke handling equipment in the Coke Oven area. Units are factory assembled and wired, complete with dc switchgear and transformers. Both rectifier units feed a common load, providing maximum availability at all times.

# ALLIS-CHALMERS

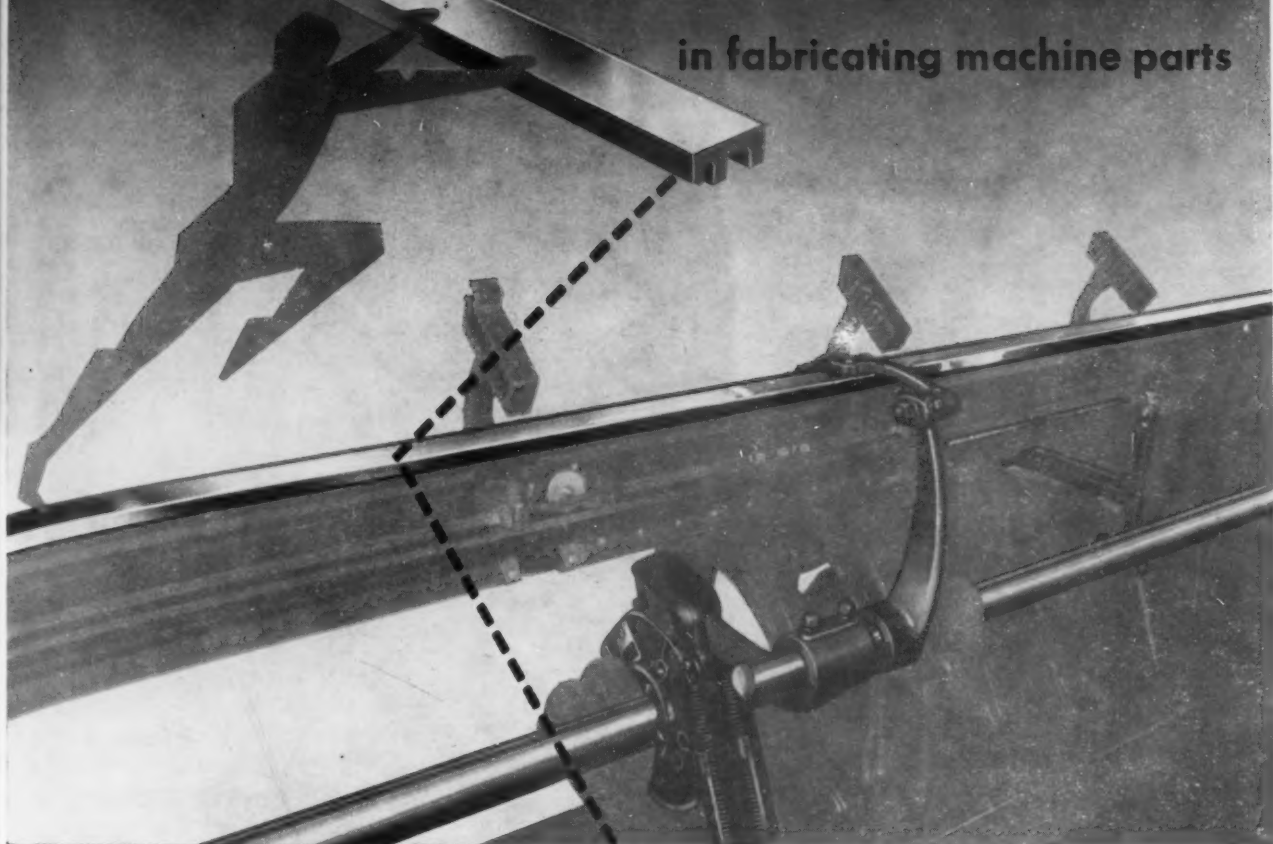
MILWAUKEE 1, WISCONSIN



# Strain-TEMPERING

Overcomes DISTORTION PROBLEM

in fabricating machine parts



B&L Strain-Tempered Steel plays a vital role in the production of precision parts, as shown by the case history of "Shape 122"—a rigid steel catchbar, used to actuate the sinker heads over the working length of a 54-foot textile machine.

This catchbar is responsible for the accurate control of 18,510 knitting elements. Such a task calls for a material capable of being accurately straightened before machining and to retain its straightness during active life.

B&L engineers developed a satisfactory steel for this purpose, plus the advantage of good machining quality. A free-machining open-hearth grade steel of special analysis was supplied in cold finished bars. It was carefully strain-tempered to give full relief from all physical and thermal strains, following which the bars were precision straightened.

The end result was the elimination of all tendencies toward distortion after machining—a precision machine part, dependable and economical.

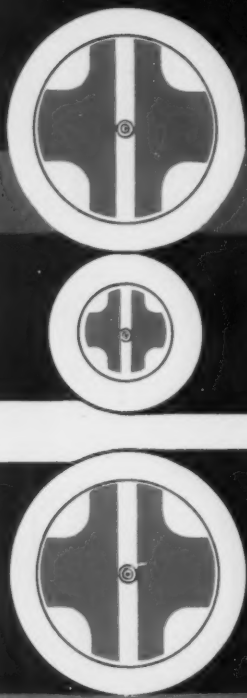
*B&L Strain-Tempering may be the answer to some of your production problems. Write for further details of B&L Strain-Tempered Bars.*

## BLISS & LAUGHLIN, INC.

GENERAL OFFICES: HARVEY, ILLINOIS  
SALES OFFICES IN ALL PRINCIPAL CITIES

FOUR PLANTS: HARVEY, ILL. • DETROIT, MICH. • BUFFALO, N. Y. • MANSFIELD, MASS.





# MACK-HEMP striped red wabblers rolls have what it takes for PLATE MILL productioneering

There's a Mack-Hemp roll with just the right physical and metallurgical characteristics for every plate mill requirement—whether for roughing or finishing.

In heavy roughing applications cast steel TECHNICALLOY rolls *have what it takes* to maintain rolling schedules.

Strong and tough Mack-Hemp NIRONITE rolls have the fine grain structure you need for intermediate and finishing passes.

And for mills rolling floor plate there's MIDLAND SUPERALLOY, a special alloy roll with the controlled hardness so essential to good product finish.

But the important thing to remember is that Mack-Hemp makes rolls for every type of mill, rolling any kind of rolled-metal products. That's why you can always be sure of the best rolls for low cost operation just by keeping an eye on what's new at Mack-Hemp.



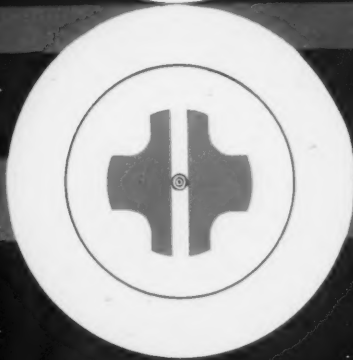
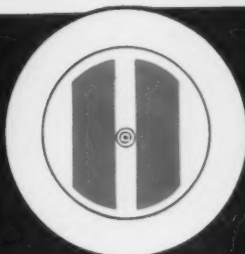
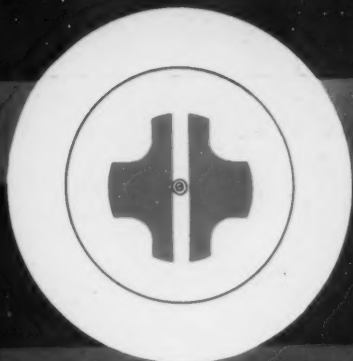
## MACKINTOSH-HEMPHILL COMPANY

Makers of the Rolls with the Striped Red Wabblers

PITTSBURGH AND MIDLAND, PA.

**MACKINTOSH-HEMPHILL PRODUCTS INCLUDE:** all types of cast mill rolls . . . improved Johnston patented corrugated cinder pots and slag handling equipment . . . Mackintosh-Hemphill rotary straighteners—electronically controlled contouring lathes—screw feed roll turning lathes—heavy-duty engine lathes . . . shears . . . end-thrust bearings . . . steel and special alloy castings . . . reversing hot strip mills . . . Y-type cold strip mills







**inventory is  
no problem  
when you**

*— call*

**CRUCIBLE**

There's no need to struggle with large inventories of special steels, when you can get prompt delivery of the steels you need from your local Crucible warehouse.

In fact, *all* of Crucible's warehouses, from coast to coast, are well stocked with REX® high speed, REZISTAL® stainless, MAX-EL® alloy, and many other special steels... in most sizes and shapes.

Let Crucible take care of your inventory problems. Why not call your local Crucible representative now?

*Stocks maintained of:*

*Rex High Speed Steel... ALL grades of Tool Steel (including Die Casting and Plastic Die Steel, Drill Rod, Tool Bits and Hollow Drill Steel)... Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes)... Max-el... AISI Alloy, Onyx Spring and Special Purpose Steels*

**CRUCIBLE**

first name in special purpose steels

54 years of *Fine* steelmaking

**WAREHOUSE SERVICE**

**CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.**

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON • DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D.C.

New facts for your file on

# USS CARILLOY STEELS

## USS Carilloy steel passes rigid tests for propeller blades

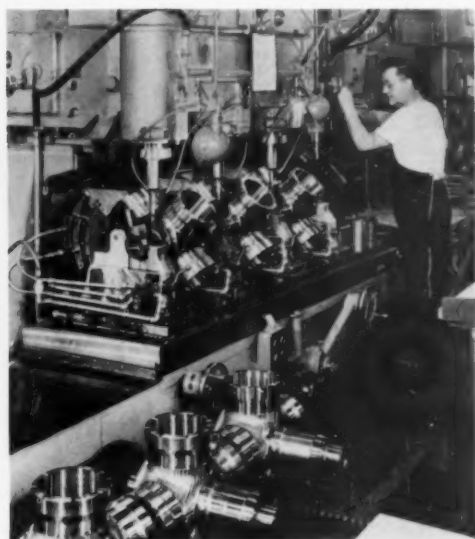
● An important manufacturer of propellers for military aircraft has found that in stringent magnaflux tests, USS CARILLOY steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U.S. Army and U.S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnafluxed several times during its production.

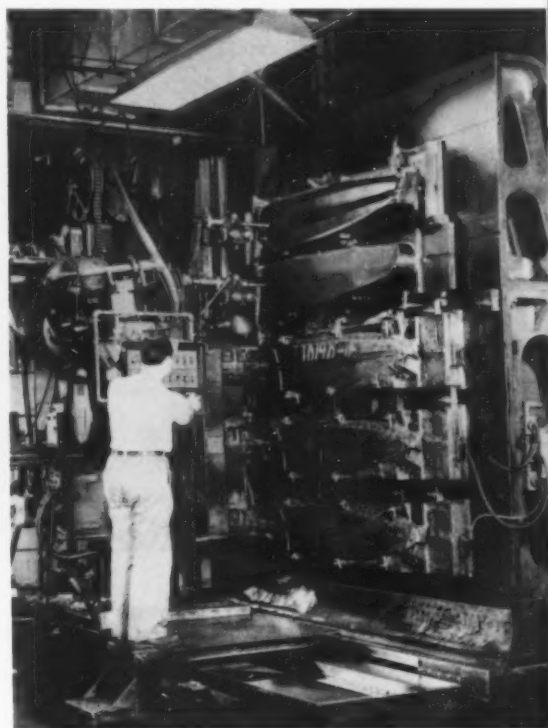
With USS CARILLOY 4340 electric furnace aircraft quality steel, this important manu-

facturer is able to count on the performance required for this severe application. The consistent high quality of USS CARILLOY aircraft steel has meant greater savings to this customer through minimum magnaflux rejections of costly fabricated parts.

USS CARILLOY steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.



THESE HIGH QUALITY aircraft propeller hubs are forged and machined from semifinished CARILLOY 4340. They meet extremely tough magnaflux requirements.



AFTER FORGING AND MILLING, 750-lb. thrust sections are hogged out on this Kellering machine. Finished sections weigh about 155 lbs. USS CARILLOY steel maintains a No. 1 quality position on these heavy-duty parts.

FOR BIG PROPELLERS, 2 forged sections (a) are welded together to form one blade thrust member. Pieces are then ground and magnafluxed, Kellered, ground, and magnafluxed again (b). Mill camber sheets (c) then are copper brazed to the thrust members. Entire unit is heat treated and polished before final magnaflux test and cadmium plating. Rigorous magnaflux testing assures that every finished blade (d) can withstand the tremendous stresses encountered on the latest high-speed planes.



UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO

TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

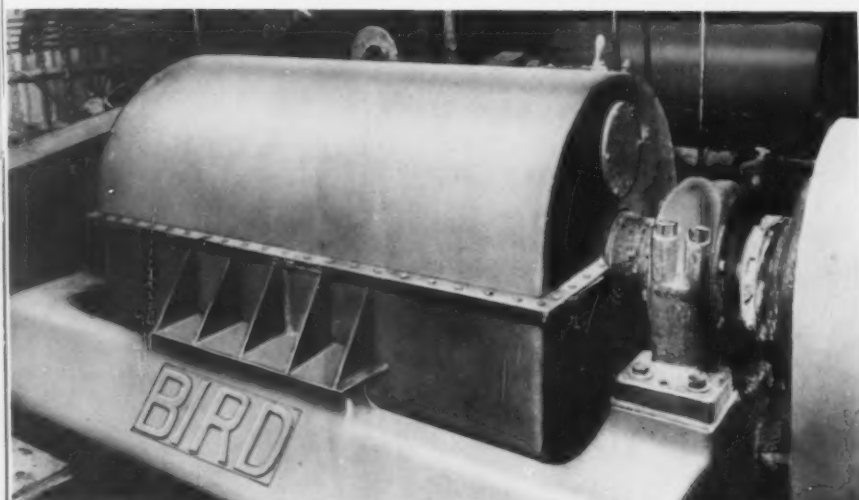


# New facts for your file on

## USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

### Solids removed from potash brine in centrifugals of Stainless Steel



THIS STAINLESS STEEL centrifugal filter at International Minerals and Chemical Corporation, Carlsbad, N. M., handles 10 tons of 60% muriate crystals per hour. It was manufactured by Bird Machine Company, South Walpole, Mass.

• Processing potash from the salt beds near Carlsbad, N. M., puts centrifugal filters to a severe test. That's why much of this equipment is made of Stainless Steel.

The potash brine is highly corrosive and the solids to be recovered are very abrasive. As a result, Bird Machine Company, South Walpole, Mass.—which supplies many of the centrifugals for this type of application—uses Stainless Steel for rotating parts and other parts of the filters that come in contact with the material.

Filters built of Stainless have handled many thousands of tons of these materials—separating and dewatering the crystalline solids—with high efficiency and overall economy.

### Lake steamer cafeteria is fabricated from Stainless Steel

The attractive appearance, excellent sanitary qualities and long life of Stainless Steel have gained a wide range of food handling jobs for this durable material.

N. Wasserstrom and Sons, Incorporated, Columbus, Ohio, in fabricating cafeteria equipment for a Great Lakes steamer, used Stainless Steel very extensively. The result is an installation that looks well, cleans easily and lasts almost indefinitely.



STAINLESS STEEL was used extensively in this cafeteria installation for a lake steamer. The installation was fabricated by N. Wasserstrom and Sons, Incorporated, Columbus, Ohio.



### Now is the time to use the sales appeal of Stainless Steel

The many benefits of Stainless Steel make its use in your product a real "plus" from a sales standpoint. Its lasting good looks alone will often justify its use. And, along with this important advantage, goes exceptional resistance to corrosion and

abrasion, ease of cleaning and low maintenance costs.

There's never been a better time to take advantage of the qualities of Stainless Steel. And when you do, be sure that perfected, service-tested USS Stainless Steel is used.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## UNITED STATES STEEL



New facts for your file on

# USS HIGH STRENGTH STEELS



## USS COR-TEN steel gives heavy-duty earth moving equipment the stamina to stay on the job

• By building maximum strength and durability into parts ordinarily prone to failure, Allis-Chalmers, through the use of USS COR-TEN steel, has ensured a high degree of productivity and profitable performance for their TW-300 Motor Wagon.

Used in the sides, ends and bottoms of the bowl of this big capacity hydraulically operated bottom dump wagon, COR-TEN steel increases strength 50% over carbon steel construction, provides 50% higher fatigue strength, materially increases resistance to abrasion and to sudden blows in loading. An added advantage is increased resistance to atmospheric corrosion—4 to 6 times that of carbon steel.

As a result, breakdowns and time-out for repairs are reduced to a minimum, as are maintenance and replacement costs.

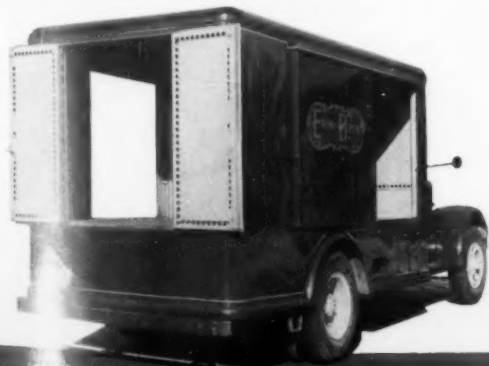


## In mass-produced truck body members, USS COR-TEN steel saves weight, adds strength, facilitates accurate construction

By mass-producing standardized truck body shapes and sections that can be readily and quickly assembled, Parish Pressed Steel Company, Reading, Pa., has made it possible for local body builders to turn out steel truck bodies to meet individual truck owners' requirements at high speeds and low cost. The use of USS COR-TEN high strength steel in these prefabricated

body sections not only permits light, strong and very durable construction, but because of the high physical properties of this steel and its consistent uniformity, it is possible to hold designs to exact limits and very close tolerances. Over-all results are much better than when less efficient materials are used.

With USS COR-TEN steel construction like this, the body builder benefits because his operations are speeded up and his assembly costs are reduced. The truck owner benefits because he gets a truck that, while light in weight, has maximum strength and durability, is readily repaired if damaged and requires minimum maintenance.



## New catalog gives complete story of USS COR-TEN steel

Here are 58 pages of factual data that show the substantial economies that can be affected in equipment and structures by using USS COR-TEN steel to reduce weight or to increase durability and service life. This book is just off the press. Crammed with information, it should be in the reference files of every designer. It fully describes the properties and characteristics of USS COR-TEN steel. Its many illustrations show the wide variety of applications in which this superior high-strength steel has been used to reduce operating costs and to keep maintenance costs at a minimum. Send for your copy.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
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UNITED STATES STEEL



# **All Lufkin Chrome-Clad Micrometers now tapped on Warner & Swasey Tapping Machines**



*Warner & Swasey No. 11 Precision Tapping and Threading Machine in use at Lufkin Rule Company, Saginaw, Michigan.*

**T**HE NAME, LUFKIN, has long been associated with extreme accuracy by users of precision measuring instruments. However, many man-hours of selective assembly were required to assure such accuracy in Lufkin Micrometers—until Warner & Swasey helped simplify and speed up their production.

Now Warner & Swasey No. 11 Precision Tapping and Threading Machines tap the high precision threads necessary in the hub and in the thimble of the micrometer. They perform each of these tapping operations in one pass, where three were previously required. And Warner & Swasey's positive lead screw principle maintains an accurate and constant lead control in these threads. No longer must an operator "feel" his way into the work by hand, or risk damage to the finished threads on withdrawal.

But of particular importance to Lufkin, operators

can now qualify the starting positions of the taps so the "zero" mark on the micrometer's thimble matches perfectly with the reading lines on the hub when assembled. This drastically reduces the time-consuming selective and individual fitting of thimble to hub formerly necessary.

Where your work requires extreme threading accuracy on a production scale, call in your nearest Warner & Swasey Field Representative. He'll explain the many unique features of the No. 11 Precision Tapping and Threading Machine, and show you how it can improve your tapping operations.

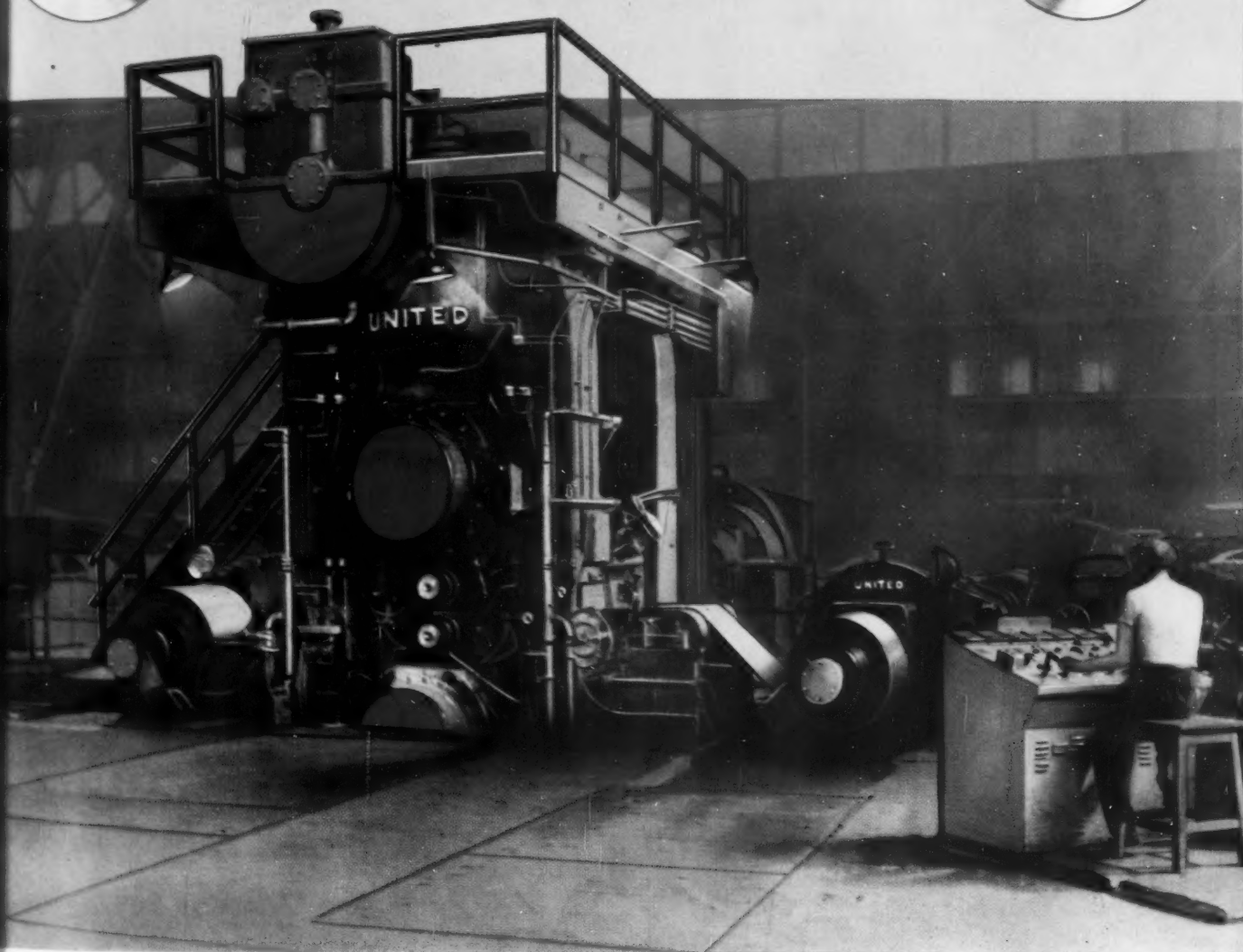


**YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY**





## 4 HIGH REVERSING COLD MILL



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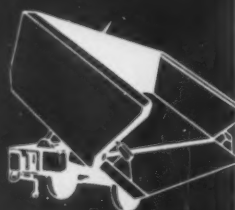
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and improved product with this

**CINCINNATI**

**Press Brake**



Automatic Side  
Dump



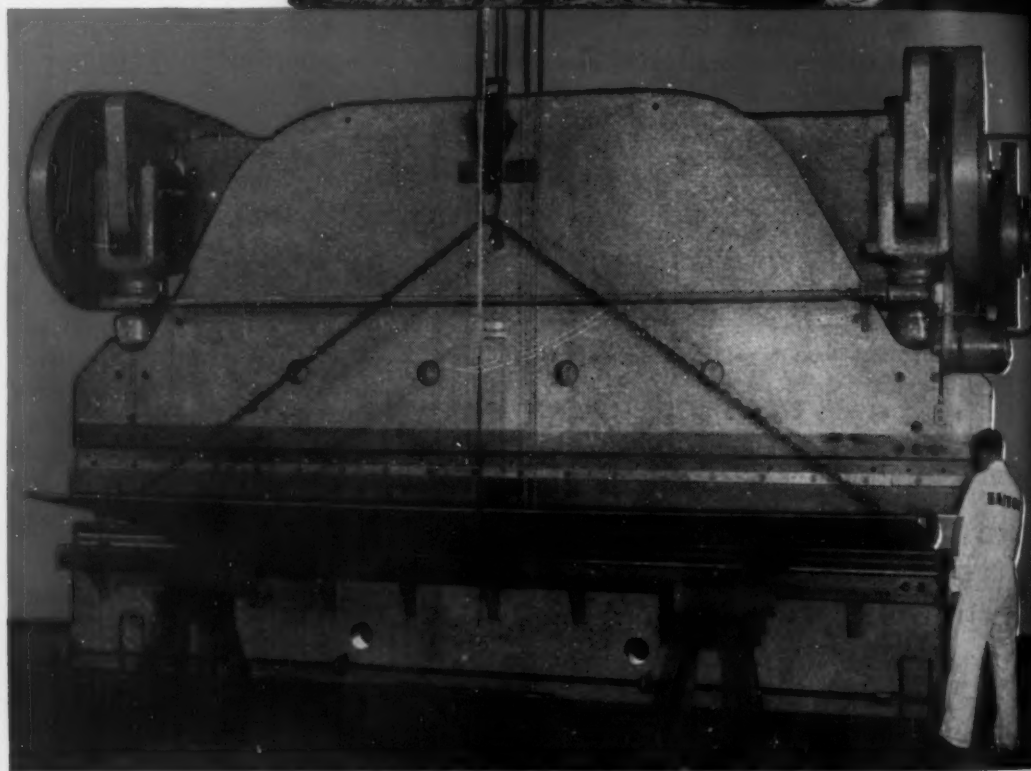
Rack Dump  
Box



Scissor Lift



Lift Truck Dump  
Bodies



*Illustration courtesy Easton Car & Construction Company, Easton, Pennsylvania.*

Here a Cincinnati Press Brake is forming  $\frac{1}{2}$ " plate for wide sections of off-highway trailers, at the Easton Car & Construction Company, makers of a large line of products for industrial transportation.

By using this Cincinnati Press Brake, some welding operations were eliminated, which improved the product, and reduced production costs at the same time.

The power, accuracy, and versatility of Cincinnati Press Brakes are reducing manufacturing costs where ever they are installed. If you form, or bend, you should investigate their possibilities.

Write for Press Brake Catalog B-4.



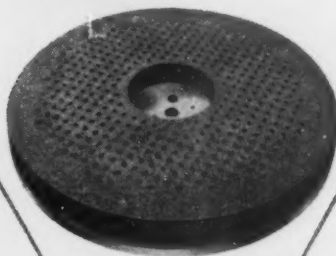
**THE CINCINNATI SHAPER CO.**

CINCINNATI 25, OHIO, U.S.A.

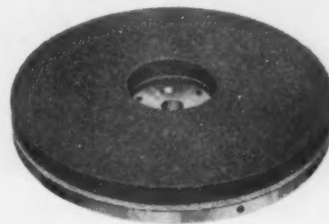
SHAPERS • SHEARS • BRAKES

# 6 Cost Cutting Abrasive Ideas to Cut Your Grinding Costs

Combined  
Smooth-Deep-Corrugated  
Wire-Lokt Disc  
Smooth section for initial shear cut, corrugated  
for fast, cool stock removal.



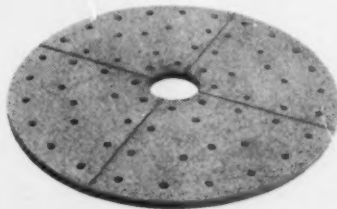
Smooth Surface  
Wire-Lokt Disc  
For general purpose grinding  
on soft steel and cast iron.



Deep-Corrugated  
Wire-Lokt Disc  
For fast, cool cutting on large areas,  
thin parts or tough metals.



Sectional  
Wire-Lokt Disc  
Large diameter discs in  
separate sections for easy  
handling and mounting.



Round Center  
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Gardner adapters permit fast,  
accurate mounting and elimi-  
nate wasteful stubs.



Square Center  
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Patented construction has four shear-  
ing edges for heavy stock removal.



118A

- Wire-Lokt Safety Construction
- Tailored to Your Grinding Needs
- Bonds for Wet or Dry Grinding
- For All Standard Types of Mounting
- Nation-wide Abrasive Engineering Service

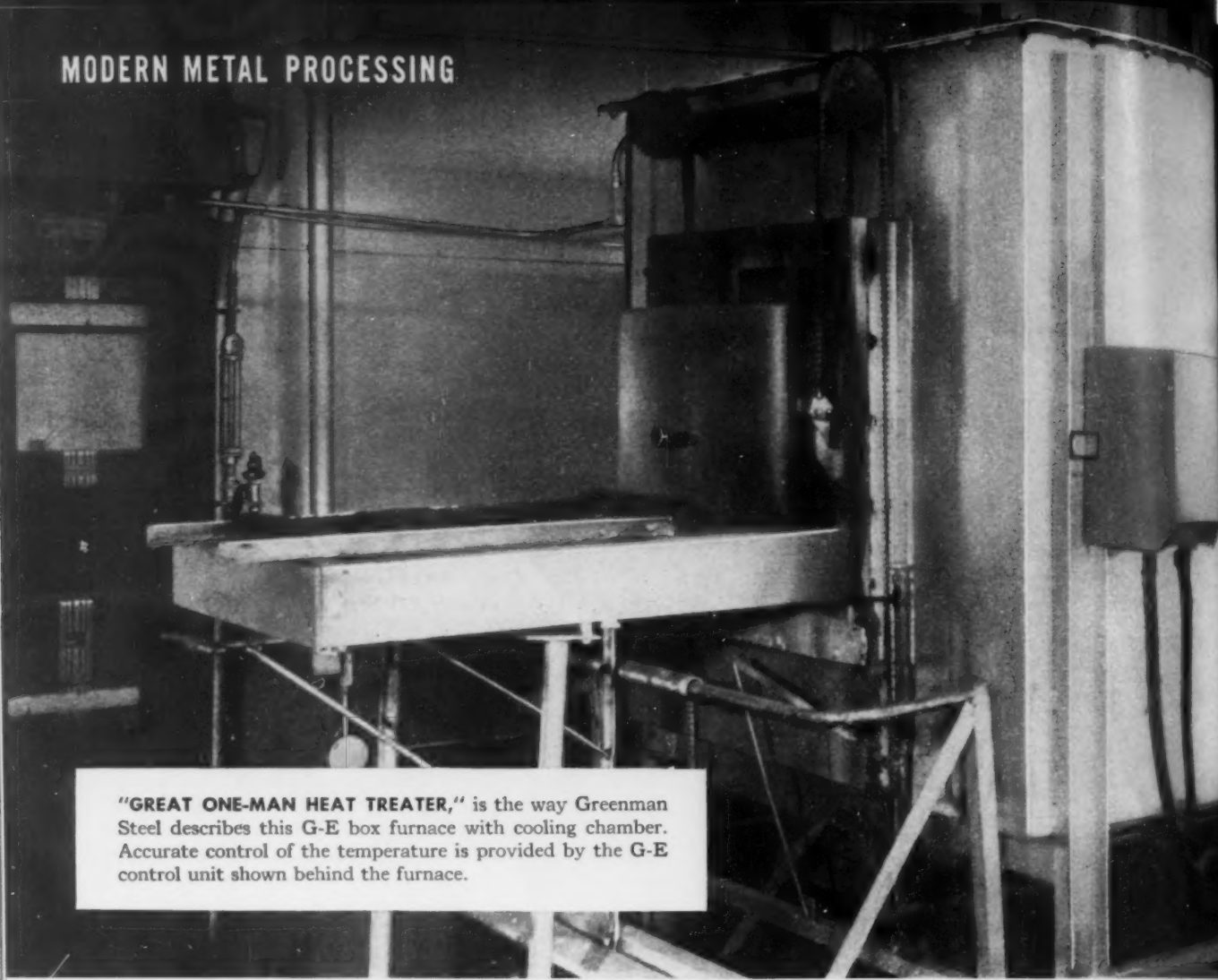
Your local Gardner Abrasive Man is ready to help you. Write  
and we will have him call at your plant.

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*abrasive  
discs*

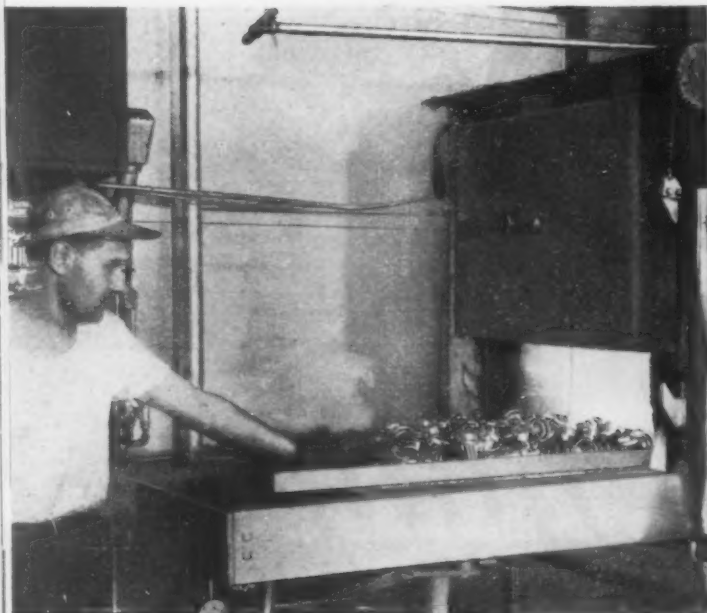


## MODERN METAL PROCESSING



**"GREAT ONE-MAN HEAT TREATER,"** is the way Greenman Steel describes this G-E box furnace with cooling chamber. Accurate control of the temperature is provided by the G-E control unit shown behind the furnace.

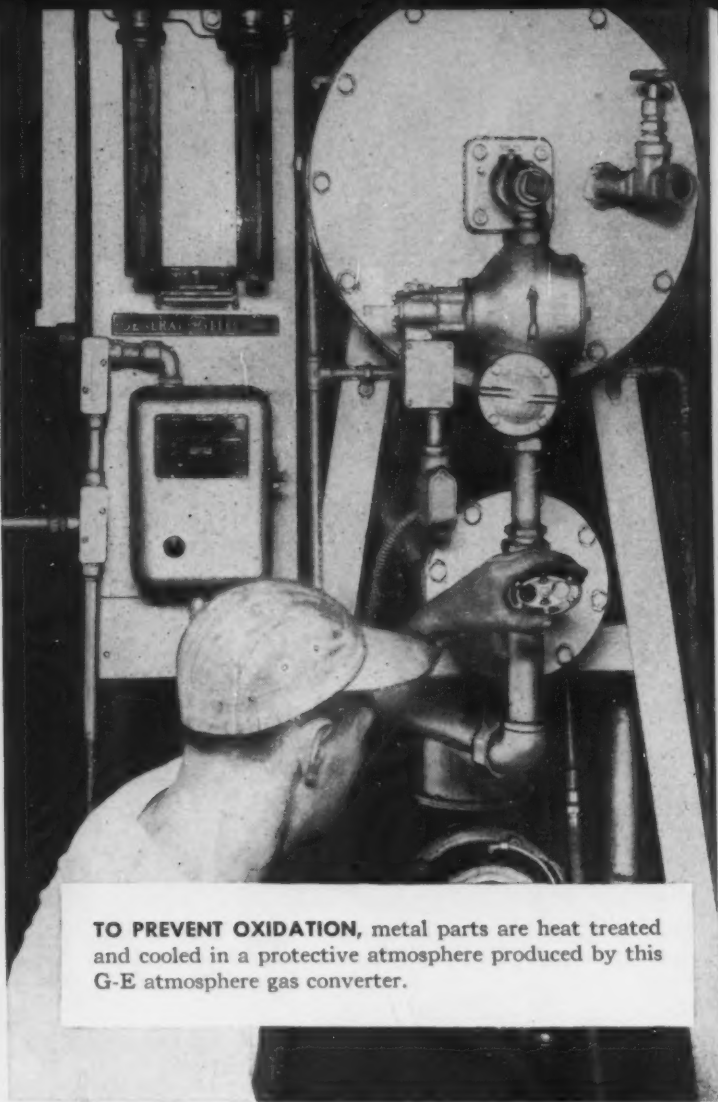
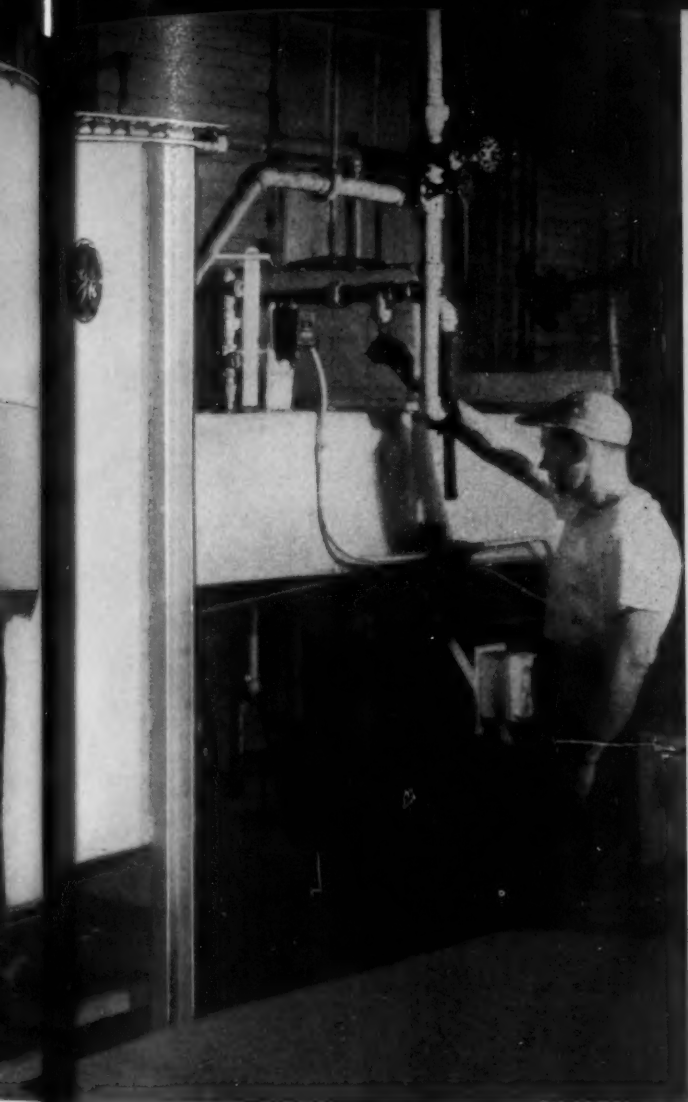
## "Versatility of G-E Furnace Almost U



**MANY HEAT-TREATING JOBS** can be done with this one G-E box furnace. Greenman Steel uses it for copper brazing, silver brazing, annealing, and hardening. Here, the furnace is employed to anneal drawn-steel cups.



**HIGH-QUALITY WORK** is achieved by moving the parts directly from the furnace to the atmosphere cooling chamber, thereby minimizing oxidation. Here, the parts emerge from the cooling chamber clean and bright.



**TO PREVENT OXIDATION**, metal parts are heat treated and cooled in a protective atmosphere produced by this G-E atmosphere gas converter.

# Unlimited," Says Industrial Heat Treater

## Operational savings of G-E furnace keep Greenman Steel competitive

Heat-treating jobbers who demand versatility in a furnace find that General Electric's box furnace with water-jacketed cooling chamber is ideal for general-purpose work.

Says Lloyd G. Field, General Manager of Greenman Steel Treating Corp., Worcester, Mass.:

"As a heat-treating jobber, we have to produce high-quality work at lower cost than equipment manufacturers can do it themselves. We must be ready to handle all sorts of heat-treating jobs, yet our investment in equipment must be kept to a minimum. We find that our G-E box furnace satisfies all these requirements. It enables us to stay competitive because it produces

superior work at low cost. It minimizes our equipment costs because its versatility is practically unlimited. We use it to copper braze, silver braze, anneal, and harden."

### MANY SAVINGS, HIGH-QUALITY WORK

Mr. Field pointed out that operating costs are low because the insulating qualities of the furnace minimize heat loss. Automatic control of the heat assures him of high-quality work.

### FOR APPLICATION HELP

Whether your operation demands a small-capacity, all-purpose furnace, or one that is engineered for a particular process and intended for high-production rates at the lowest possible cost, General Electric can satisfy your requirements. For application help from a G-E Heating Specialist, contact your G-E Apparatus Sales Office.

# GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN METAL PROCESSING BULLETINS

• Furnace and Induction Brazing, GEA-5889

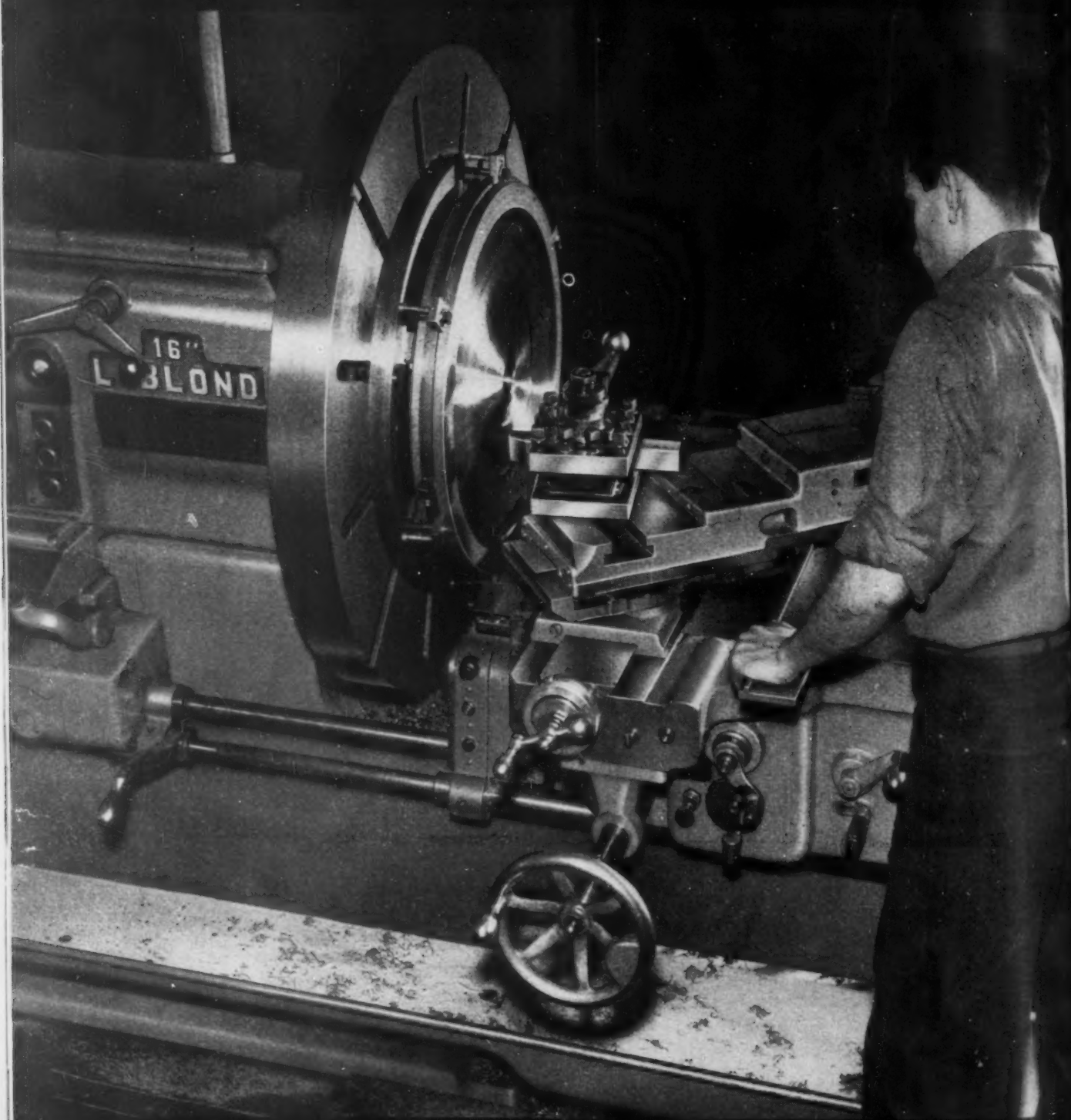
• Annealing Malleable Iron, GEA-5797

• Forging with Induction Heat, GEA-5983

• Heat-treating Aluminum, GEA-5912

Address: General Electric Co., Section 720-129, Schenectady 5, N. Y.

# "LeBlond Lathes help us tu



**Turning Tough Titanium—** A LeBlond 16"/38" Sliding Bed Gap Lathe with Hydra-Trace\* performing the difficult job of contour facing a titanium forging. Columbia Machine Products likes the LeBlond for its smooth power, rigidity and versatility.

\*Hydra-Trace (Office) attach pound

TH

WO



# turn tough Titanium successfully"

...says *Columbia Machine Products, Brooklyn, N. Y.*

Turning titanium is tough. Columbia builds its success on licking problems like this, and dependable equipment plays a vital role. To Columbia that means LeBlond Lathes—for the smooth power, rigidity and versatility they need.

For example, take the job shown on the left. A jet engine rotor compressor disc is being machined from a titanium forging. This contour job is faced on a LeBlond 16"/38" Sliding Bed Gap Lathe equipped with LeBlond Hydra-Trace\*. Operating specifications must remain Columbia's trade secret. We can say, however, that they must hold tolerances as close as .0005" and finish to 32 microinches.

Columbia explains, "Since these titanium forgings are extremely costly, yet have no chip or scrap

value, we must have dependable accuracy and finish without spoilage. Speed is important, too, because of the substantial amount of material that must be removed. LeBlond Lathes have what it takes to do jobs like this successfully, at competitive prices. One word sums up our feelings about LeBlonds—Excellent!"

Whether you're turning tough titanium or more conventional materials, one of LeBlond's 76 lathe models will fill the bill—exactly! LeBlond offers a complete line of lathes from the 13" Regal to the 50" Heavy Duty. Also available are Sliding and Plain Bed Gap lathes; Hollow Spindle lathes; Dual Drive lathes; Tool Room and Rapid Production lathes. For the *right* lathe for your job, call your nearby LeBlond Distributor, or write us.

*Ask for Catalog 54-A for a description of LeBlond's complete line.*

\*Hydra-Trace (Trade Mark, Registered U. S. Pat. Office) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of the compound rest on practically all LeBlond Lathes.

**turned faster by**



THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

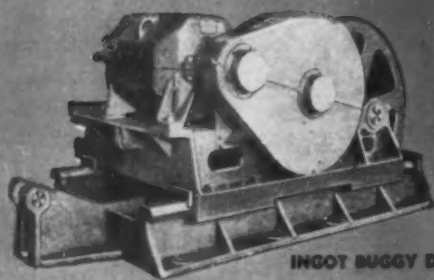
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CLEANING LINE



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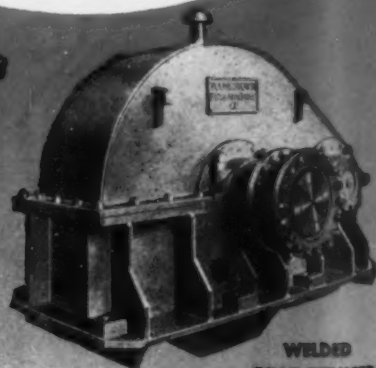
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- ▶ Strip Steel COILERS and REELS—SCRAP BALLERS
- ▶ RAILROAD Spike Forming Machines—ROLL LATHES
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PARALLOY ROLLS



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42" ROLL LATHE

*Machinery Built to Customer's  
Design and Detail Drawings*



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OVER SIXTY YEARS OF SERVICE TO THE STEEL INDUSTRY

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**Only Yoder-TOCCO<sup>®</sup>  
Makes**

*Welded Tubing*

**at 250'  
per minute**

**in Regular Production**

Yoder-TOCCO mills, using the patented TOCCO Process for welding ferrous pipe and tubing are actually producing pipe at speeds of 150 to 250 feet per minute. This rate is almost twice as fast as any other cold forming pipe mill in production anywhere in the world. *Check these advantages:*

- ✓ A production speed of 250' per min.
- ✓ lower cost because of increased production and lower maintenance.
- ✓ a smooth, continuous weld—no stitching.
- ✓ an extra strong weld—because it's 100% uniform and continuous.
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- ✓ controlled weld flash—either I. D. or O. D.—or in some cases none.

Whether it's welding, heat-treating, brazing, melting or heating for forging operations, it pays you to investigate TOCCO Induction Heating as a means to better products, faster and at lower cost.

**THE OHIO CRANKSHAFT COMPANY**



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## Ask Your LYON Dealer

• Hunting for the best source of steel equipment is time-consuming and not at all necessary.

Your Lyon Dealer offers the world's most diversified line of quality steel equipment. (A few of Lyon's 1500 standard items are shown below.) Equally important, he can show you how to get the most out of steel equipment in terms of saved time, space and money. Call him and he'll come a-runnin' with a 76-page catalog brim-full of equipment and ideas.

LYON METAL PRODUCTS, INC.  
Gen. Offices: 636 Monroe Ave., Aurora, Ill.  
Factories in Aurora, Ill. and York, Pa.  
Dealers and Branches in All Principal Cities

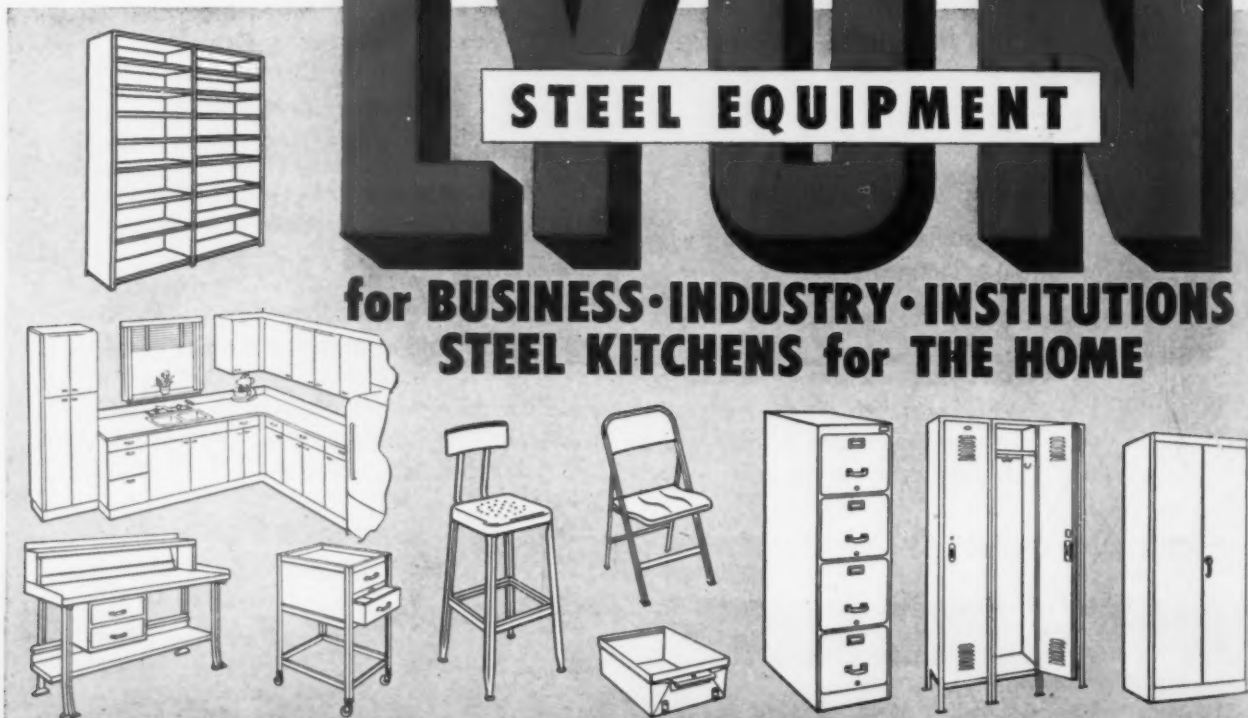


*Lyon also has complete facilities for manufacturing special items to your specifications*

# LYON<sup>®</sup>

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**STEEL KITCHENS for THE HOME**



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| • Stools    | • Storage Cabinets | • Tool Boxes  | • Toolroom Equipment   | • Revolving Bins    | • Work Benches    | • Drawer Units  | • Tool Trays  |
| • Bin Units | • Drawing Tables   | • Parts Cases | • Wood Working Benches | • Hanging Cabinets  | • Bench Drawers   | • Hopper Bins   | • Shop Desks  |

Here's important news  
for strip producers, processors  
and welded pipe producers—

# BLISS ACQUIRES ALL RIGHTS TO WELD-A-MATIC SPLICERS

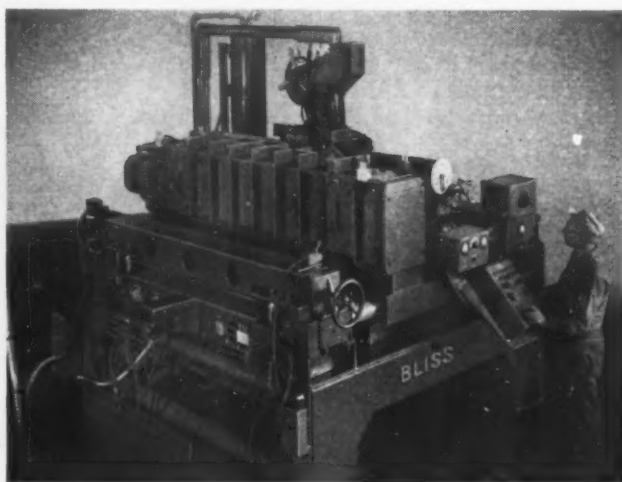
All rights to the Weld-A-Matic Splicer line used for ferrous and non-ferrous splicing have been acquired by E. W. Bliss Company from the dissolved Arms-Franklin Corporation. The agreement transfers to Bliss all patent rights, engineering drawings, service, operating and empirical data.

Weld-A-Matic Splicers are widely used for the splicing of strip for coil build-up, continuous feeding of skelp in light wall-pipe making, reuniting silicon sheets into continuous coils and many other uses.

Gages spliced range from 0.006 in. to 0.3125 in.; speeds up to 120 in. per minute depending upon gage. Weld-A-Matic Splicers are completely equipped and easy to operate, under the shielded-arc principle: no special welding skills required by operators.

E. W. Bliss is continuing research and development of the line. Though some grades of aluminum can now be welded, Bliss is seeking to widen the application. In addition, Bliss plans to manufacture two of the more popular models as standard—others will be designed to suit special requirements.

For more information, write or call for a Bliss engineer.



Remember:

**BLISS**  
SINCE 1857

for Presses, ROLLING MILLS, Special Machinery

**E. W. Bliss Company • General Office: Canton, Ohio**  
**ROLLING MILL DIVISION: SALEM, OHIO**

Subsidiary: The Die Supply Company, Cleveland, O. • E. W. Bliss (England) Ltd. • E. W. Bliss Company (Paris) France  
U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. Branch Offices in Chicago, Cleveland, Dayton, Detroit,  
Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. West Coast Representatives: Moore Machinery Co.,  
Los Angeles and San Francisco; Star Machinery Company, Seattle. Other representatives throughout the world.



# *New Torque Converters* *boost **PAYLOADER**® output*

## **For faster, more economical bulk-materials handling**

Here's good news to the users of "PAYLOADER" tractor-shovels. These two popular models now include torque-converter drive as standard equipment! Extensive testing of both units shows that new peaks of performance are provided. Prove to yourself that these two famous "PAYLOADER" tractor-shovels are still the finest in their class. Ask your "PAYLOADER" Distributor for a demonstration, or write The Frank G. Hough Co., 733 Sunnyside Avenue, Libertyville, Illinois.

**Greater Output** — because machines operate at highest speed in relation to load.

**Lower Upkeep** — because the oil cushion absorbs load shocks and because clutch life is greatly increased.

**Easier Operation** — because much gear-shifting and "clutching" are eliminated.

**More Efficiency** — because engine operates at most efficient speeds and without laboring or stalling.

**YOU CAN'T COMPETE IF YOUR EQUIPMENT IS OBSOLETE!**



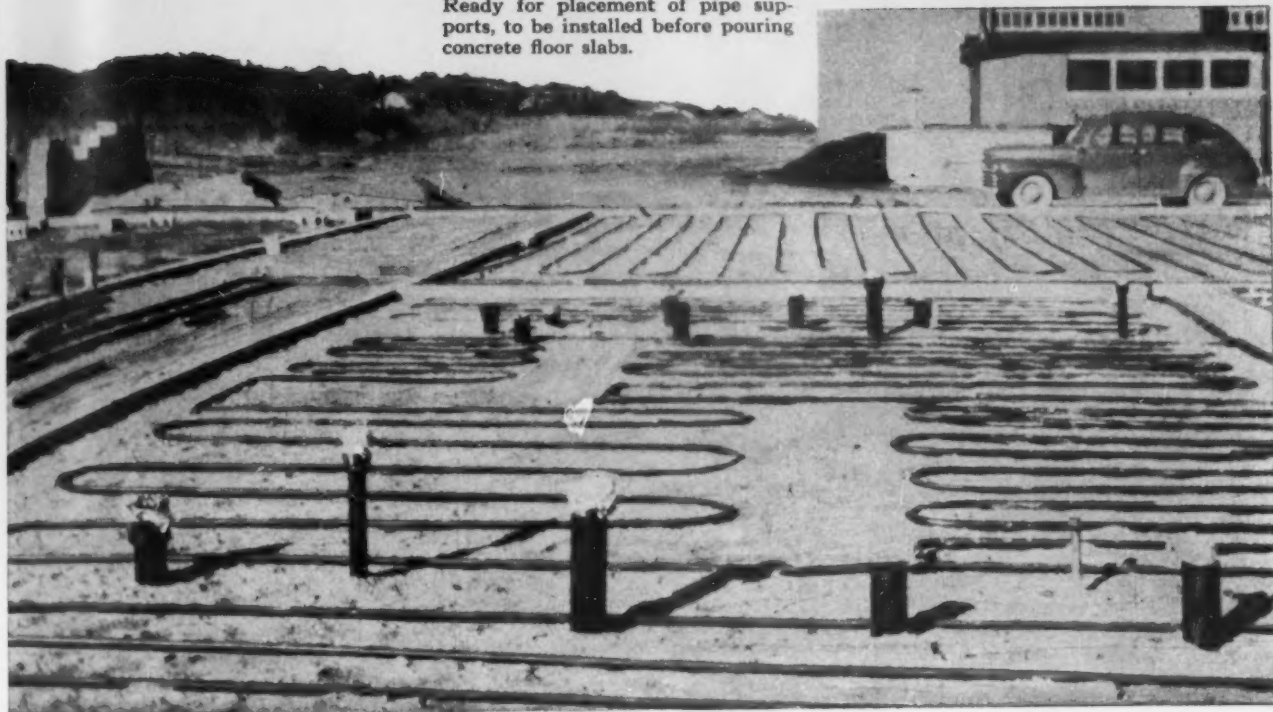
# **PAYLOADER®**

THE FRANK G. HOUGH CO. • Since 1920





**Where It Can Save You Money**  
Yoloy pipe used for radiant heating.  
Ready for placement of pipe supports, to be installed before pouring concrete floor slabs.



**long life  
underground too**

*... Piping of high strength  
low alloy steel containing nickel  
provides multiple advantages*

INDUSTRY has widely adopted concealed piping for such diverse applications as radiant heating indoors and removal of snow from city streets.

Regardless of its purpose, however, where buried or concealed piping is involved *only long-lasting pipe can be economical.*

You can see such piping, above, made from the same composition of nickel alloyed steel which has proven so successful in the oil, mining, railroad, chemical, trucking and other industries.

Weldable, and of high mechanical strength, it is produced by The Youngstown Sheet and Tube Company, Youngstown, Ohio, under the trade-name Yoloy Continuous Weld Pipe.

In standard tests, Yoloy shows four to six times greater resistance to atmospheric corrosion than does carbon steel. Furthermore, Yoloy piping resists attack from highly sulphurous atmosphere, brine and many other corrosives.

In addition, it resists abrasion and shock to an

extent unmatched by any carbon steel of equal strength.

Another valuable advantage . . . Yoloy pipe can be electric or gas welded, readily. And the welds show approximately the same strength and ductility as the parent metal.

Easy to thread and fabricate with standard pipe tools, Yoloy Continuous Weld Pipe is one more example of the improved performance and ready response to fabrication derived from steels containing nickel.

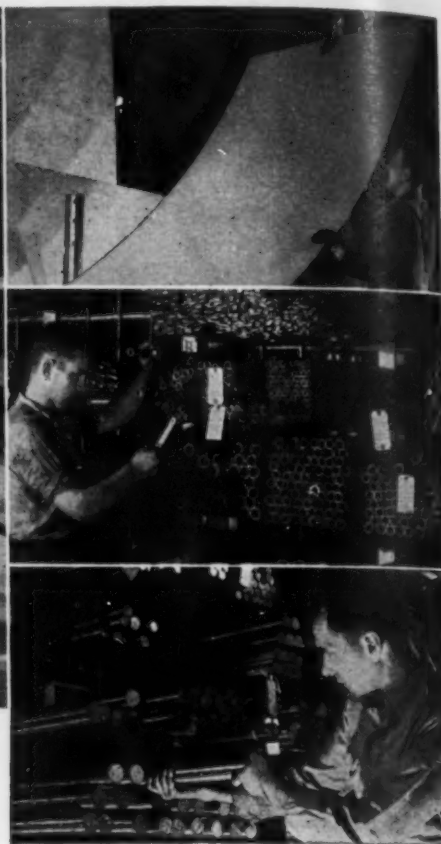
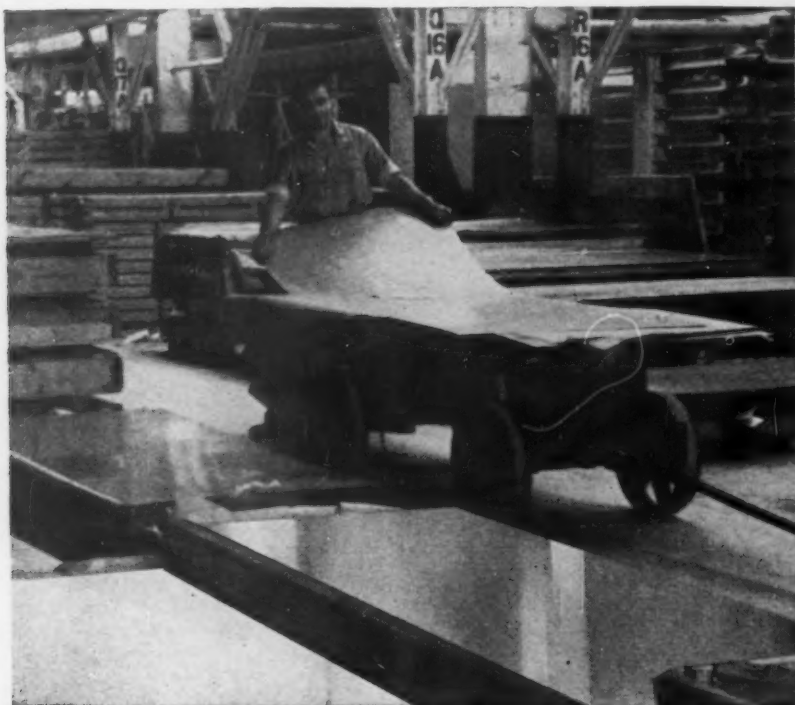
In all sorts of applications, nickel alloyed steels prove to be lowest in ultimate cost. For actually, the many standard grades available make it easy to select exactly the right one to meet any reasonable combination of fabricating and service demands.

Whatever your industry, send us details of your metal problems. We'll be glad to help you with suggestions based on wide practical experience.



**THE INTERNATIONAL NICKEL COMPANY, INC.**

67 WALL STREET  
NEW YORK 5, N.Y.



# Is there a better STAINLESS for you ?

2221 kinds, forms, finishes and sizes in our stock for quick shipment

So much improvement is being made every day in stainless. New extra-low carbon sheets and plates for special welding requirements, light plates for polishing and stainless tubing to name but a few. You may not be using the exact type that is best from a fabrication, long life or cost standpoint.

So we urge you to let our Ryerson stainless specialists help you select the right type for each particular purpose.

And whether you need stainless, or

any other kind of steel, depend on Ryerson for immediate delivery from stock.

## STAINLESS IN STOCK

**SHAPES:** Sheets & Strip • Plates • Rounds • Squares  
Flats • Hexagons • Angles • Pipe • Tubing  
Fittings & Fastenings

**TYPES:** 301, 302, 303-C, 303-S, 304, 304-L, 309,  
310, 316, 321, 405, 410, 416, 430, 430-F,  
440-C

**CONDITIONS:** Hot Rolled, Cold Drawn, Centerless  
Ground

**FINISHES:** #1, #2B, #2D, #3, #4

# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND  
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

with **UDYLITE** equipment,  
sales grew and grew and grew—*automatically*



From this simple beginning...

that take place in a plating plant when executive management makes the decision to go *automatic* ... with Udylite.

Lee Silver Service, Inc. supplies precision plated parts to automotive and appliance companies, in quantities running into the millions. Production surpasses 80,000 precision plated parts daily ... yet, consider ...

This business, started only 15 years ago, was once a two-man operation in a basement ... so small that their first month's plating supplies were carried into the shop in one hand by the Udylite delivery man.

But the men behind Lee Silver Service, Inc. were sold on the great potential for a company specializing in gold and silver plating ... and they knew

### *The Remarkable Account of How a Basement Plating Shop Expanded to a Big Producer*

On Helen Avenue, in Detroit, stands an eloquent symbol of the remarkable improvements

their future would ultimately include the finest in automatic plating machines. When, in 1947, they landed the biggest order for silver and gold plating ever sold—supplying silvered cabinets and gold fittings for the anniversary model of a famous automatic washing machine—they knew the days of hand-delivered supplies were a thing of the past.

During this development Udylite and Lee Silver worked hand in hand. Today this company is 100% Udylite automatic. Sales have soared. Production has zoomed. Rejects have been cut to .4 of 1%. Yes, progress and growth have come ... *automatically!*

If you are in the plating business to stay, it's inevitable that you, too, will come to Udylite automatic equipment eventually ... why not look into it today ... *now.*

... to this completely automatic plating plant—with Udylite equipment and technical guidance all the way!



PIONEER OF A BETTER WAY IN PLATING ...

**THE**  
***Udylite***  
**CORPORATION**  
DETROIT 11, MICHIGAN



# No strain in bending



## WHY YOUNGSTOWN BUCKEYE CONDUIT IS BETTER

Youngstown is the one manufacturer who makes rigid steel conduit from ore to finished product. This enables Youngstown to control the complete manufacturing process—your insurance that each length of "Buckeye" is made of top-grade steel.

# Youngstown



●Any electrician recognizes Youngstown rigid steel conduit the moment he starts to bend it. He'll tell you that Buckeye is easier and faster to bend than any other kind. This means you save hours of labor with Youngstown Buckeye Conduit.

## THE YOUNGSTOWN SHEET AND TUBE COMPANY

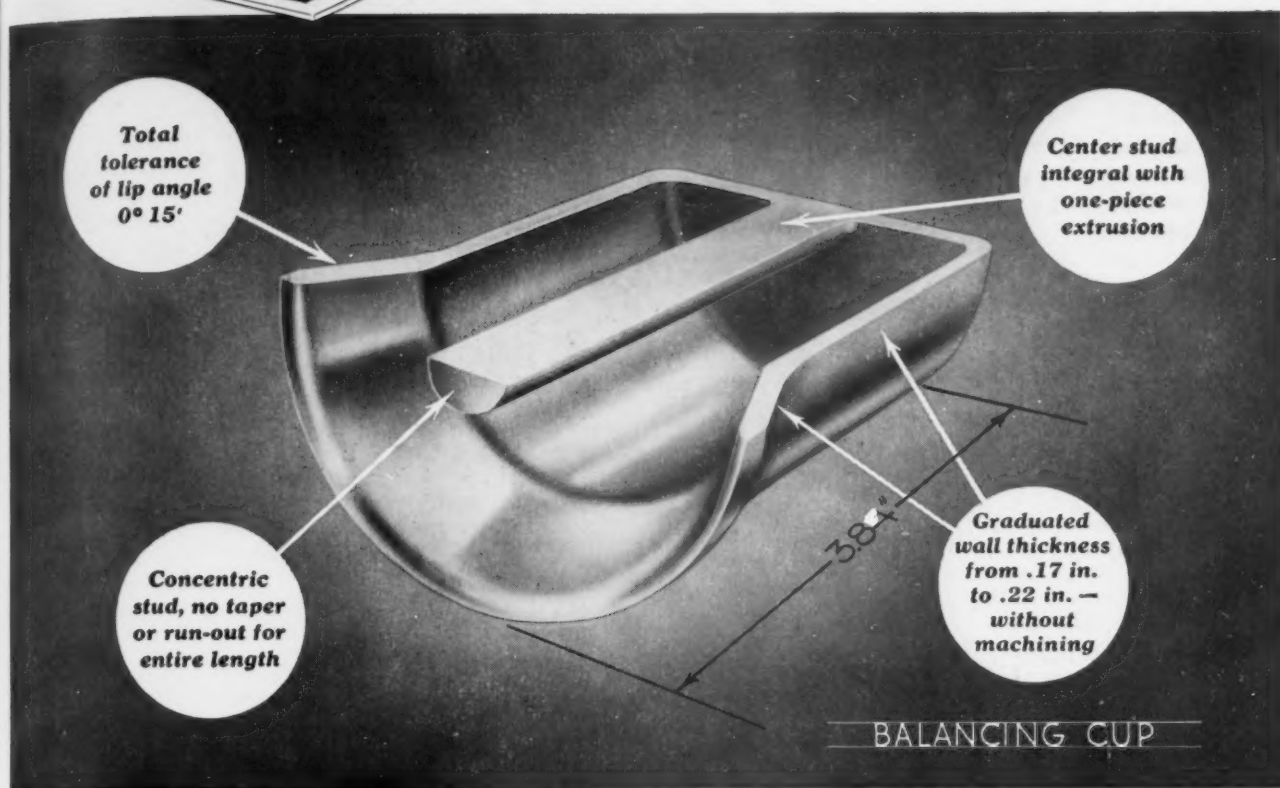
Manufacturers of  
Carbon, Alloy and Yaloy Steel

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT  
AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE -  
HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES



*Now Mullins Koldflo makes your dream design practical*



**In this Balancing Cup—low cost carbon steel replaced expensive alloys — and ...**

**Mullins *Koldflo* extrudes this finished part in one piece... *without machining***

- You can now design intricate steel parts the way you want them — without compromise
- You can add important new sales features
- And Mullins Koldflo design cuts your costs

**M**ULLINS *Koldflo* opens big new horizons for designers everywhere. You can now put many of your dream ideas *into production*. Just call your nearest Mullins office and an experienced Mullins *Koldflo* sales engineer will help you design parts that can now be mass produced by the Mullins *Koldflo*\* process! Write for booklet "*How would you tool-up to make an egg?*"

\*Trade-Mark

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***Koldflo***

**DIVISION**

**MULLINS MANUFACTURING CORPORATION**

*Salem, Ohio*

**Phone — Salem 8771**

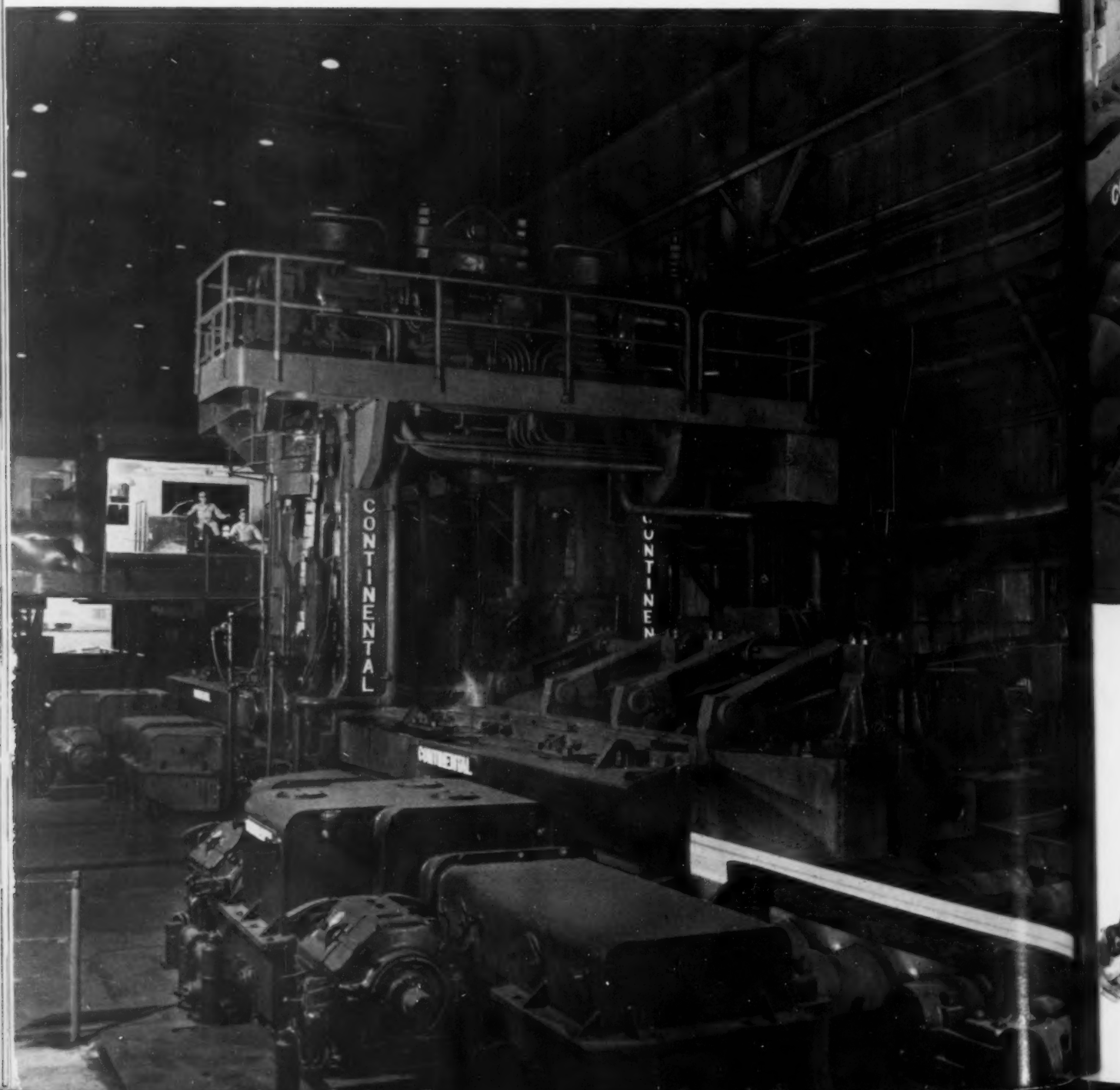
June 24, 1954

# CONTINENTAL

## 40-INCH BLOOMING-SLABBING MILL

### WITH AUXILIARY EQUIPMENT IN FAIRLESS WORKS

Continental designed and built this complete 40-inch Blooming-Slabbing Mill for United States Steel Corporation's new Fairless Works. Installed for intermediate blooming, it also has been employed in rolling slabs direct from ingots.



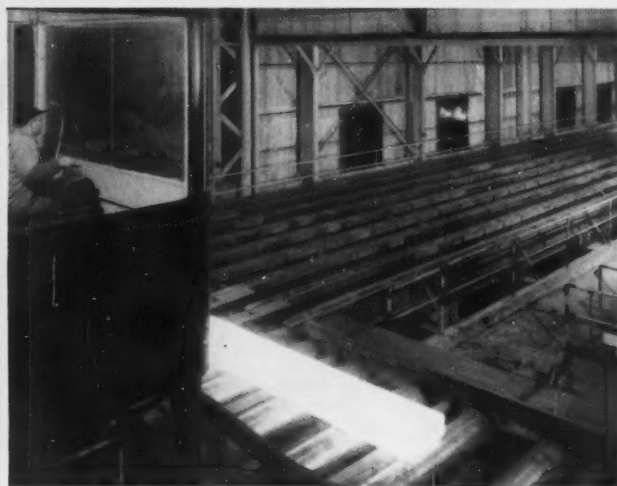
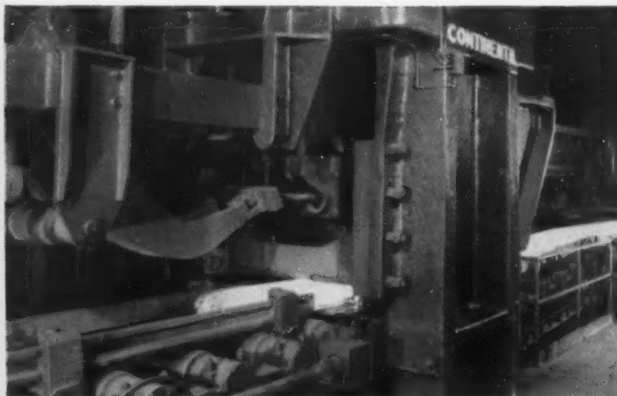




◀ View of mill from Operator's Pulpit.

▼ Continental Downcut Bloom and Slab Shear.

▼ Continental High Speed Transfer delivering blooms to the mill.

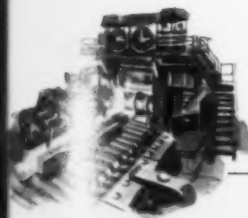


## ★ Complete Rolling Mill Installations ★

ROLLS

STEEL CASTINGS

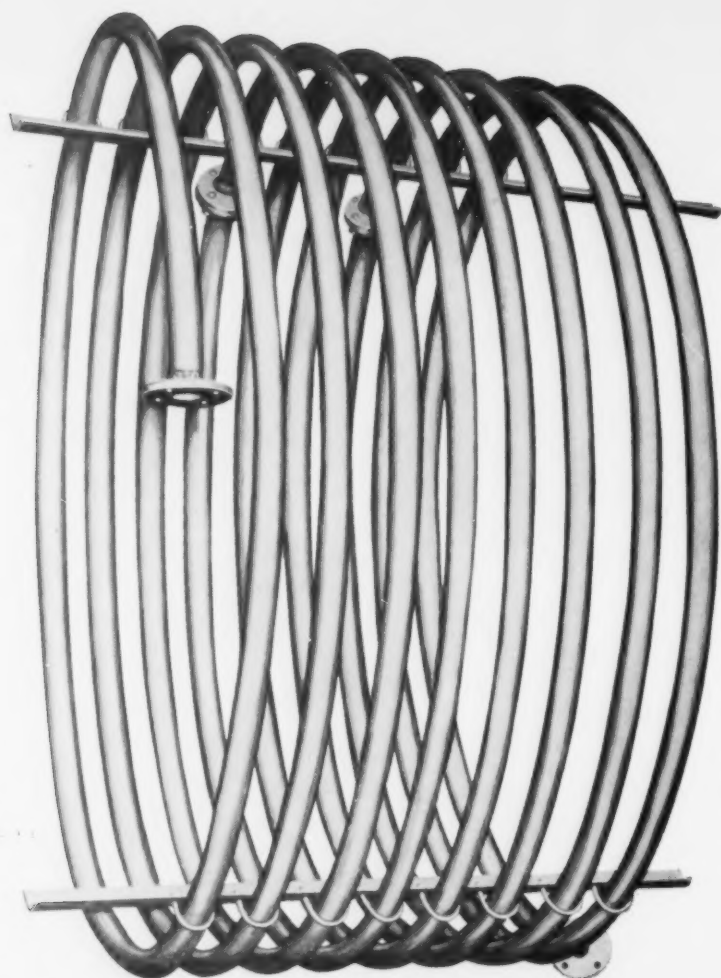
WELDMENTS



*Plants at*  
East Chicago, Ind. • Wheeling, W. Va. • Pittsburgh, Pa.

CHICAGO • PITTSBURGH

**CONTINENTAL**  
Foundry & Machine  
Company



Coils like this, measuring 7 feet in diameter, are used in preparation of a dyestuff intermediate. They must withstand severe corrosion, abrasion, and wide temperature changes.

## How to S-T-R-E-T-C-H Coil Life

...in  $H_2SO_4$  and other strong corrosives

... Switch to *Carpenter* Stainless No. 20 Cb !

By making coils like the one illustrated out of this super corrosion-resistant stainless, service life was DOUBLED . . . maintenance costs reduced to almost zero! Carpenter Stainless No. 20 Cb offers extraordinary resistance to  $H_2SO_4$  in various concentrations, and free sulphate ions, at temperatures up to boiling. It is completely resistant to many other

strong corrodents such as arsenic, benzoic, carbonic, citric, picric, and mixed acids; acid-zinc solutions, and acetate solvents.

Send for FREE TEST SAMPLES to compare No. 20 Cb with other materials in your conditions. Prove to yourself that No. 20 Cb is best where corrosive conditions are worst. Ask for bulletin containing corrosion resistance, properties, performance results, applications, and fabricating data. For quick information on tubing, pipe, sheet and plate of Stainless No. 20 Cb, write, phone or wire . . .

Other Forms of Carpenter Stainless No. 20  
BARS • STRIP • WIRE  
Contact The Carpenter Steel Co., Reading, Pa.

# *Carpenter*

The Carpenter Steel Company, Alloy Tube Division  
Union, N. J.

Export Dept.: The Carpenter Steel Co., Fort Washington, N.Y.  
"CARSTEELCO"



## STAINLESS TUBING & PIPE



- guaranteed on every shipment

How JESSOP's pride in a  
Fine Steel Product helps  
make it a Better Buy for you



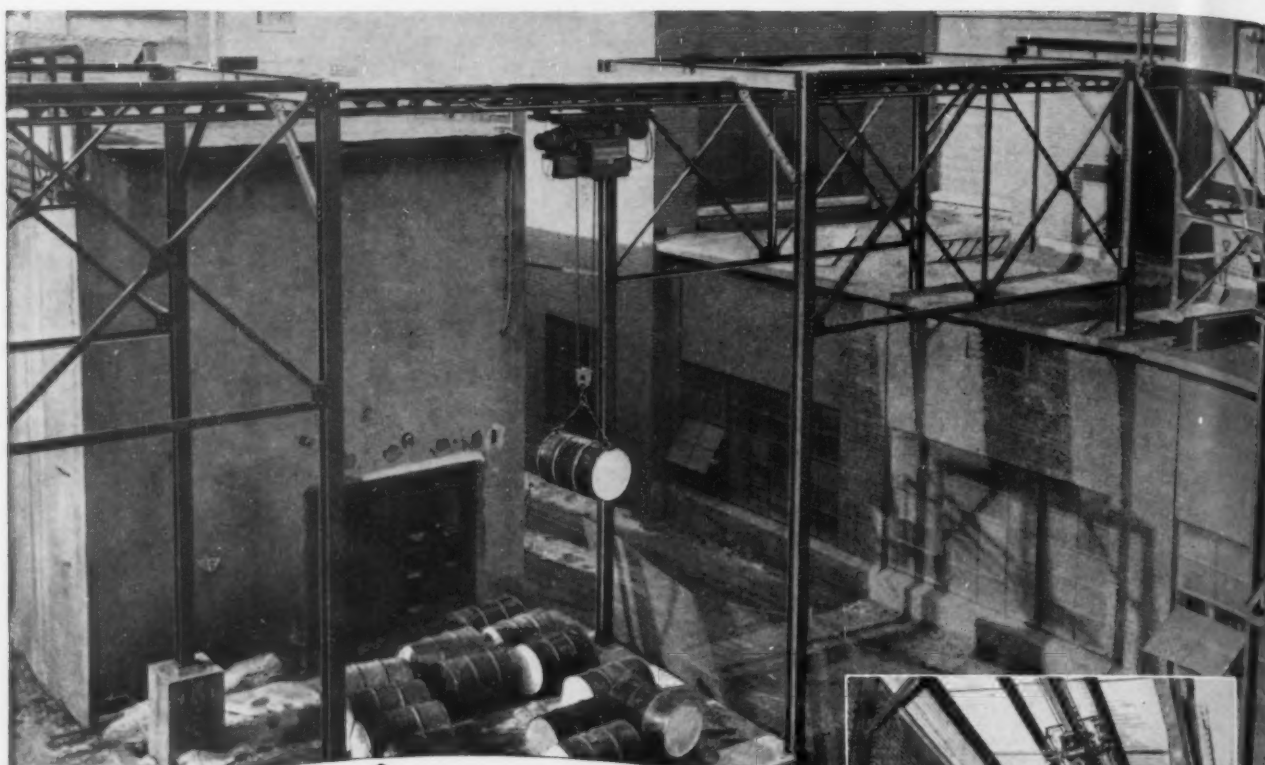
Of all the fine specialty steel products produced at Jessop, none is closer to the hearts of Jessop men than tool steel in the form of precision ground flat stock shown here. So much care is taken that this product will reflect Jessop's ability, that even the splendid new building in which each piece is processed, wrapped and stored is reminiscent of a research laboratory. As a customer, here's how you profit by this expression of pride. You can be completely confident of the utmost accuracy of size, finish and analysis. You can be sure of fast service, even on special sizes, because Jessop always carries an extensive stock on hand for immediate delivery. If

you think you might have an application for Truform oil or Windsor air hardening precision ground flat stock in the realm of dies, gages, cutters, machine parts, straight edges, or the like, write for literature. If not, show this ad to a friend who might. No one can go wrong by dealing with Jessop.

# JESSOP

STEEL COMPANY · WASHINGTON, PA.





Carrier at intermediate station where it has stopped automatically as preselected. The Tramrail track is about 30 feet above ground level.

Starting a heavy drum on its way from the warehouse by depressing a wall-mounted push button. Hoist capacity is 2,000 lbs.



## Automatic Dispatch System Eliminates Need of Three 10-Ton Trucks

**An outside system operating  
between three buildings**

Not only was the need of two 10-ton trucks obviated by a Cleveland Tramrail automatic system at the Mica Insulator Company, Schenectady, N. Y., but the purchase of a third truck was made unnecessary. While the trucks had to travel over a circuitous route, only a short, straight Tramrail track is required for the overhead system.

Many man-hours of trucking and handling time are saved because materials dispatched over the automatic Tramrail system can be han-

dled by production workers along with their regular jobs. A great amount of handling on an elevator has also been eliminated and better elevator service is available for other purposes.

The system has been found particularly helpful during night shifts when an extra drum of varnish or roll of cloth is sometimes needed. Formerly trucks were never available for night hauling. The Tramrail equipment paid for itself out of savings it created in a short period.



**GET THIS BOOK!**  
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

**CLEVELAND TRAMRAIL DIVISION**  
THE CLEVELAND CRANE & ENGINEERING CO.  
4865 East 284 Street, Wickliffe, Ohio

**CLEVELAND**  **TRAMRAIL**  
**OVERHEAD MATERIALS HANDLING EQUIPMENT**



# McLouth

STAINLESS

# Steel

High quality stainless sheet  
and strip steel . . . for the product  
you make today and the  
product you plan for tomorrow.

**McLOUTH STEEL CORPORATION**  
**DETROIT, MICHIGAN**

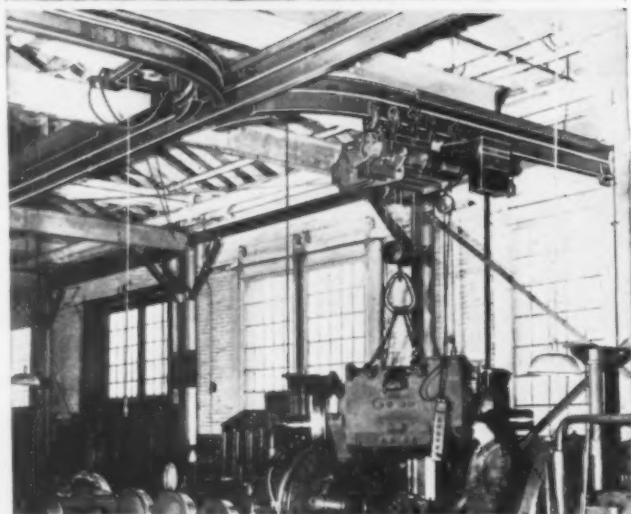
*Manufacturers of Stainless and Carbon Steels*

# what MONORAIL can do . . .



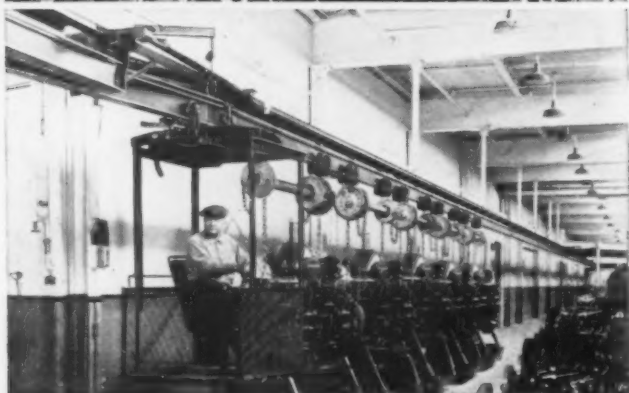
## WHERE SPACE IS LIMITED

MonoRail relieves operating congestion by transferring materials handling to unused overhead area. Equipment can often be installed with no loss of production.



## TO MOVE VARIABLE LOADS

Any size or shape of load, within the capacity of a MonoRail system, can be moved by using slings, grabs or other quickly changed "below the hook" devices for hand or electric operation.



## FOR LOW MAINTENANCE COSTS

American MonoRail equipment is specially engineered and carefully built for long-life, rugged service. Manual or automatic operation continues with little or no downtime for maintenance or repair.

Send for Bulletin C-1 illustrating hundreds of successful MonoRail installations.



**AMERICAN**

OVERHEAD  
HANDLING  
EQUIPMENT

# MONORAIL

COMPANY

13103 ATHENS AVENUE • CLEVELAND 7, OHIO



# DEPARTMENTAL CORRESPONDENCE

REMOVAL AND STORAGE OF DEFENSE MACHINERY  
Director of Purchases  
Plant Engineering Dept.

Our plant requires outside help to remove,  
process, transport and store 2100 machine tools.  
This job must be done to government specifications  
as tools are defense machinery subject to being  
reactivated quickly. Advise name and address of  
qualified contractors.

*W. M. M.*  
Vice President  
Plant Engineering Dept.

*Call Commercial Contracting  
they're doing this kind of  
work now for a number  
of large corporations.*



## FOR COMPLETE INFORMATION WRIT

COMMERCIAL CONTRACTING CORPORATION DEPT. M-  
12160 CLOVERDALE • DETROIT 4, MICHIGAN

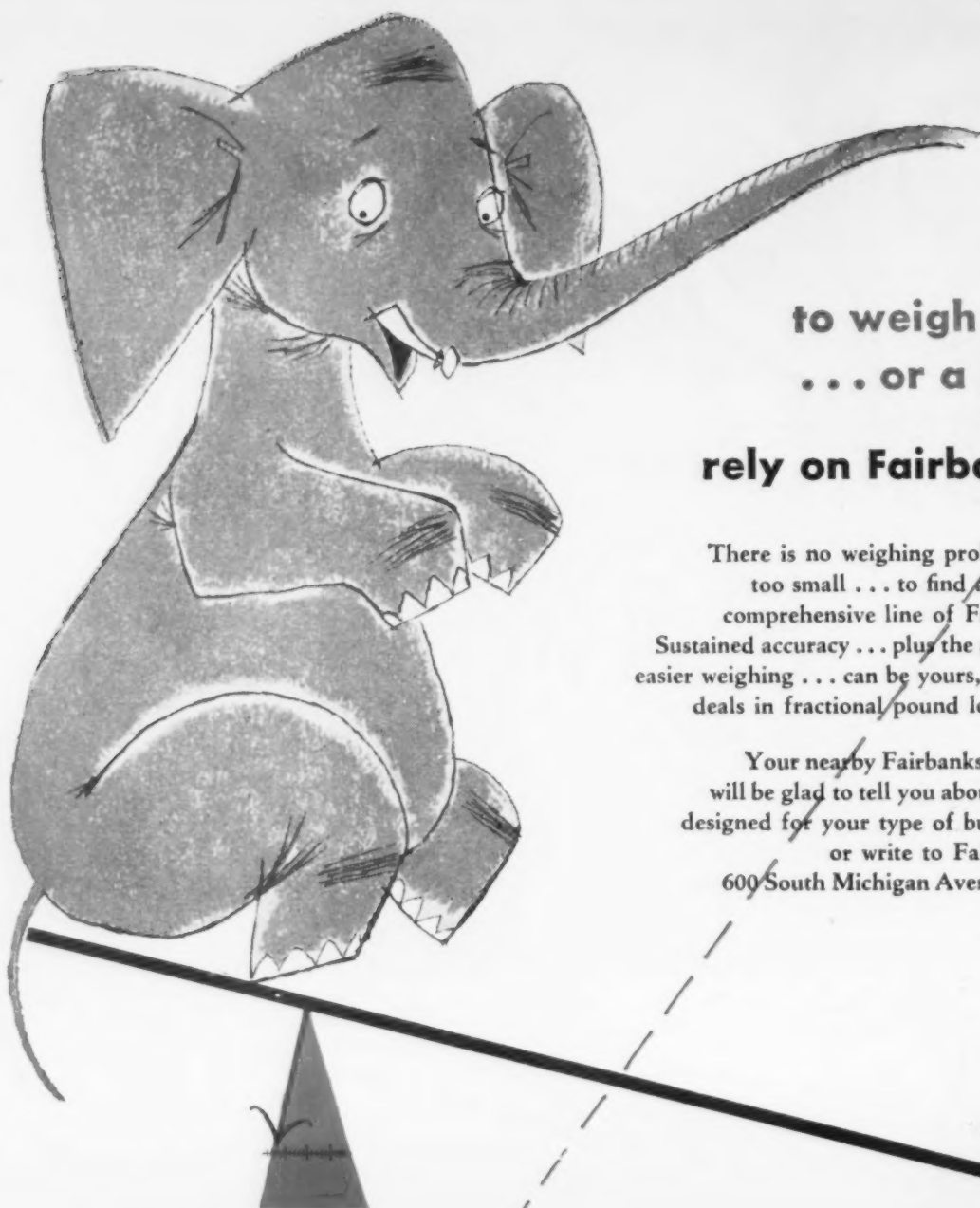
Please send information on Removal and Storage  
of Machinery.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

COMPANY \_\_\_\_\_

COMMERCIAL CONTRACTING CORPORATION • General Contractors  
12160 CLOVERDALE, DETROIT 4, MICHIGAN • TEXAS 4-7400

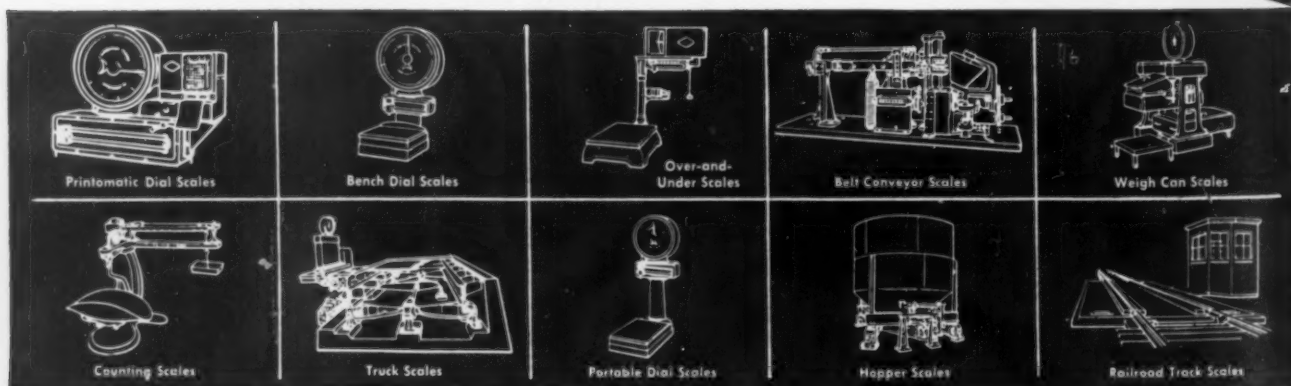


to weigh a package  
... or a pachyderm

## rely on Fairbanks-Morse

There is no weighing problem too large ... or too small ... to find a sound solution in the comprehensive line of Fairbanks-Morse Scales. Sustained accuracy ... plus the advantages of speedier, easier weighing ... can be yours, whether your business deals in fractional/pound lots ... or truck loads.

Your nearby Fairbanks-Morse Scale Specialist will be glad to tell you about the scales specifically designed for your type of business. See him soon, or write to Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.



# FAIRBANKS-MORSE

a name worth remembering when you want the best

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY  
RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

# FREE TECHNICAL LITERATURE

These publications describe money - saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

(Continued from Page 114)

## Regulators

Complete line of gas regulators is fully described in a 36-p. catalog. Cylinder, manifold and pipeline regulators are illustrated with complete descriptions covering specifications and operating data. Each regulator has a chart showing types of gages used with it, inlet and outlet connections, maximum flow cfh and maximum working pressure psi. Also included are flow and pressure charts indicating at what point the regulators can be used to perform a particular job. *Air Reduction Co.*

For free copy circle No. 16 on postcard.

## Machine tools

Complete line of new and used machine tools is covered in an indexed catalog. All items featured in the catalog are for immediate delivery, subject to prior sale. Many are new, and the used models are selected items from latest stock books, having been through reconditioning shops to insure working order. Each is priced including boxing and delivery F.O.B. British Port. *F. J. Edwards Ltd.*

For free copy circle No. 17 on postcard.

## Stainless steel

Stainless steel products of all types are covered in a comprehensive guide and reference book. Conveniently indexed, the publication gives information on analysis, physical data, and available types and sizes of such products as machine screws and nuts, nails, washers and other hardware, pipe fittings, wire cloth, and flexible hose. *Schnitzer Alloy Products Co.*

For free copy circle No. 18 on postcard.

## Tubing

New booklet lists the variety of tubing offered by Wallingford Steel Co. which includes ornamental, mechanical, pressure, sanitary, aircraft and shaped. Each type of tubing, and the application for which it is suitable, is explained in detail. Also described are the production, research and control facilities used to assure customers that specifications for tolerance, analysis and finish will be met. *Wallingford Steel Co.*

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## Lubricating

Catalog gives information on equipment designed for servicing lubricated valves. High pressure lubrication of valves used by chemical and process industries, pipelines, and refineries offers money saving advantages. It eliminates removing, replacing and turning lubricant screws. Various types of lubrication fittings, hose assemblies, follower plates, pressure gages and other accessories are covered. *Stewart-Warner Corp.*

For free copy circle No. 20 on postcard.

## Pyrometers

Rapid temperature determinations of minute spots, fast moving objects or small streams at comparatively long distances and point by point are made with the Pyro optical pyrometer, described in a 6-p. bulletin. This type of pyrometer can be used for measuring temperatures from about 1400° F. to highest known temperatures. The instrument is designed for heavy-duty shop practice as well as laboratory use. *Pyrometer Instrument Co.*

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Turn Page

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 6/24/54

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FIRST CLASS  
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BUSINESS REPLY CARD  
No postage necessary if mailed in the United States

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THE IRON AGE

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NEW YORK 14, N. Y.



## Free Technical Literature

Continued

### Vacumes

Booklet releases information on the new Spencer Vacume. It lifts, sorts, removes and conveys and will handle metals, lints, liquids or gases. Vacume can be carried to the job in pipes or on wheels, and used in off production periods to reduce health, fire and explosion hazards. More than 100 special applications mostly heretofore unpublished, are contained in this book. It is claimed that the use of this vacume will outmode tedious and laborious jobs now done by hand. *Spencer Turbine Co.*

For free copy circle No. 22 on postcard.

### Friction saw

Folder illustrates and gives information about the high speed friction saws for cutting grating and structural steel. All controls are grouped in the operating head where the operator can watch work and control all operations. Also described is the "111" cutoff saw for cutting of any material. High speed action of the sawing head is said to give faster cutting and more production. *Ty-Sa-Man Machine Co.*

For free copy circle No. 23 on postcard.

### Aluminum

Booklet gives engineers and contractors authoritative data on friction losses in air conditioning duct systems. Book reports experimental tests which demonstrated that the greater smoothness of aluminum results in less friction loss. At high velocities, it is stated, aluminum is advantageous because it permits more air to flow through small ducts. At lower velocities it is reported that use of aluminum reduces power requirements because friction loss is minimized. *Kaiser Aluminum & Chemical Corp.*

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### Chain

Book containing engineering data has been published discussing the versatility of silent chain. It has many applications ranging from fractional horsepower drives to

### More Literature Available

Many companies offer free literature and other information in their advertisements. For the names of these firms see the company listings in the index of advertisers.

huge drives transmitting thousands of hp. Silent chain combines the flexibility and quietness of a belt with the positive action of gears and can be operated on short centers. Section on drive components lists available chain widths, chain and wheel dimensions, wheel tolerances, material and other pertinent data. *Link Belt Co.*

For free copy circle No. 25 on postcard.

### Washers

Pamphlet gives helpful information and pictures on the manufacture and availability of metal and fiber washers, both standard and special. It also contains useful data on general washer characteristics, tolerances, and facilities for meeting individual requirements. In addition the publication lists standard washers carried in stock and gives existing die sizes for the production of more than 30,000 types and sizes of washers. *H. K. Metalcraft Mfg. Co.*

For free copy circle No. 26 on postcard.

### Steel

Booklet has been issued which gives up-to-date information on cold-rolled specialties including stainless, alloy and carbon spring steels. It discusses melting, edge, condition or temper, finish and packing. Illustrated with photographs, diagrams and charts, the booklet is of particular value to producers and users of saw blades, knives, hand tools, springs, and other purchasers of cold-rolled special purpose steel. *Crucible Steel Co. of America.*

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BUSINESS REPLY CARD  
No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE

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Village Station

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FIRST CLASS  
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New York, N. Y.

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 6/24/54

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## Fuel costs reduced **ALMOST 95%**


Here's real economy! This 35-ton Plymouth with Torqomotive Drive\* operates for more than 18 weeks on the amount of fuel its predecessor of similar size used in 1 week! Coupled with this reduction in fuel use were tremendous savings in maintenance and repairs, especially clutches. Pittsburgh Ferrous Products Company (Mifflin Works), Glassport, Pennsylvania, uses this modern Plymouth to

haul up to 8 cars loaded with scrap metal over 2% grades and around tight curves. It pulls, switches and spots with sure, time-saving smoothness. These are some of the many advantages awaiting you in the great Plymouth line. Why not get the whole story? Write for descriptive catalog. Models from 3 to 70 ton, Gasoline, Diesel, Diesel-Electric, with mechanical or Torqomotive Drive.

**THE FATE-ROOT-HEATH COMPANY • Dept. A-2, Plymouth, Ohio**

# **PLYMOUTH® TORQOMOTIVES**

**\*TORQOMOTIVE DRIVE: PLYMOUTH TRANSMISSION WITH HYDRAULIC TORQUE CONVERTER**



## SCENE 114:

... an actual scene from the GTD-Greenfield  
sound film "FACTS ABOUT TAPS AND TAPPING"

VOICE: "Sometimes a very special tap is the  
only solution to a difficult threading  
problem . . . Here we see a special tandem  
tap designed by GTD-Greenfield engineers  
to enable a pump manufacturer to tap three  
concentric holes in one operation . . .  
Special taps may far offset higher initial  
cost in greater production on the job."

**GREENFIELD**  
TAP AND DIE CORPORATION  
GREENFIELD, MASSACHUSETTS

This 26-minute full-color motion picture  
"FACTS ABOUT TAPS AND TAPPING" is  
now available for group showing through  
your local GTD-Greenfield distributor.



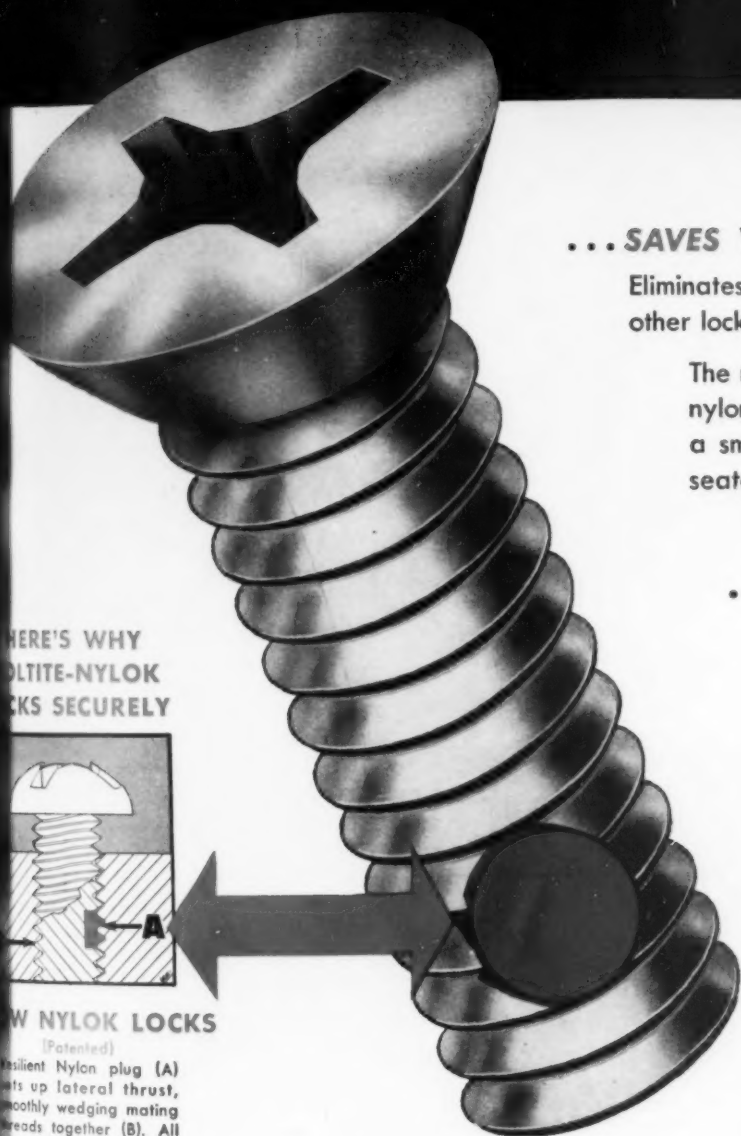


# Introducing . . .

## HOLTITE NYLOK SCREWS

Reg.

### ONE-PIECE SELF LOCKING SCREWS AND BOLTS



HERE'S WHY  
HOLTITE-NYLOK  
LOCKS SECURELY



HOW NYLOK LOCKS  
(Patented)

Resilient Nylon plug (A)  
exerts up lateral thrust,  
smoothly wedging mating  
threads together (B). All  
locking action is on  
the threads; head is not  
stressed. Locking is posi-  
tive seated or unseated.

#### ... SAVES YOU TIME AND MONEY!

Eliminates safety wire, lock washers, jam nuts, and all other locking devices.

The new Holtite-Nylok screws and bolts employ a nylon insert in the threaded section that provides a smooth, positive locking action. Seated or unseated, they lock where stopped.

#### ... PLUS THESE EXTRA ADVANTAGES

- Positive Locking
- One piece; eliminates separate auxiliary parts
- Readily replaced
- Interchangeable
- Re-useable
- Locks seated or unseated
- Defies vibration
- No harm to mating thread of parts
- Acts as a seal for gases and liquids under high pressures

#### YOU CAN ALWAYS COUNT ON CONTINENTAL'S ENGINEERING SERVICE

As Holtite-NYLOK fasteners are presently intended for specific applications, our engineers welcome the opportunity to study your individual requirements and make recommendations for the most efficient and economical applications.

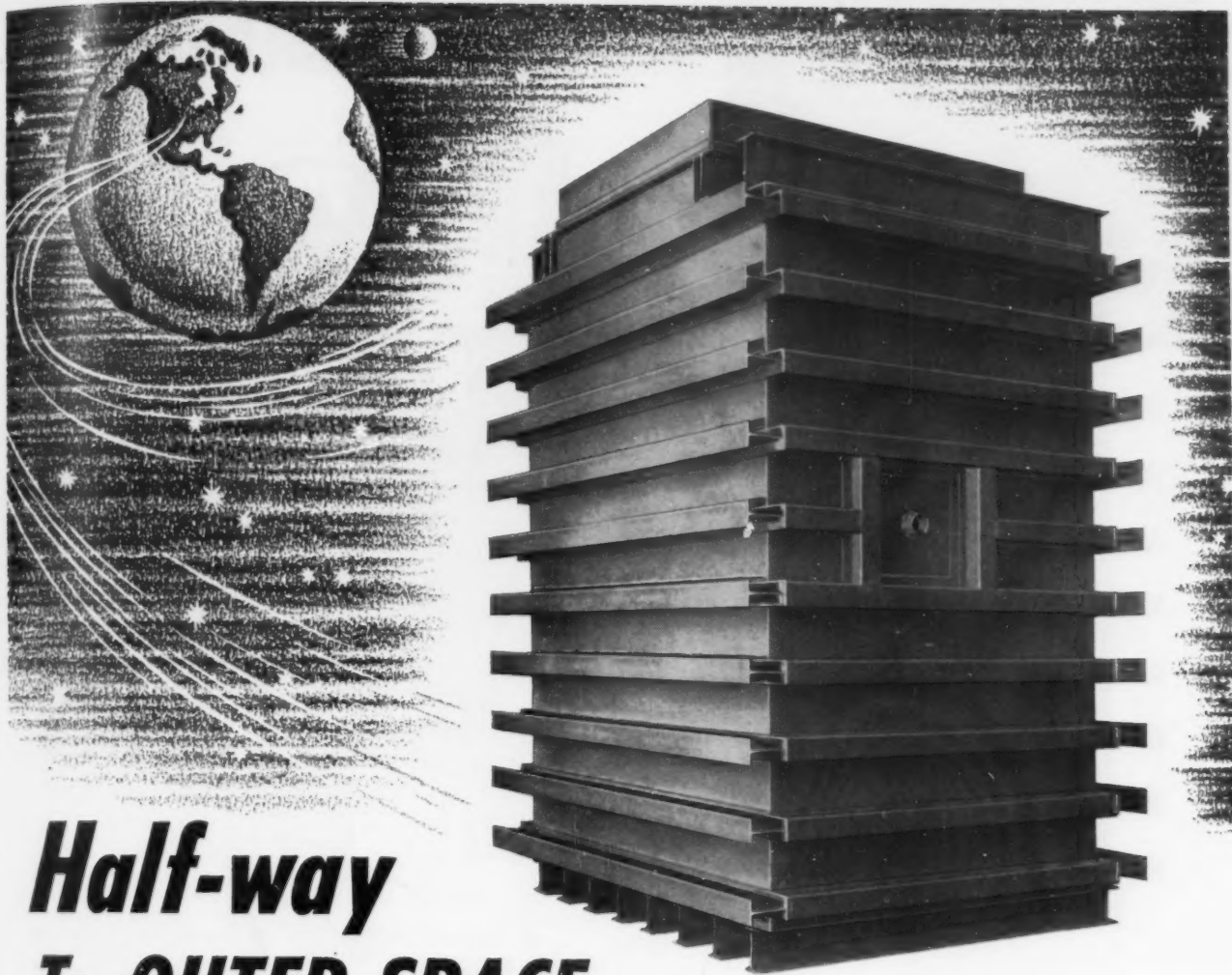
Why not check your own assemblies today. There's a good chance Holtite-NYLOK can boost your output, and save you money.

## CONTINENTAL SCREW COMPANY

NEW BEDFORD, MASSACHUSETTS, U. S. A.

# Bay State Grinding Wheels





# Half-way To OUTER SPACE and Back... in an ACME Weldment

Inside this steel test chamber men and equipment will face the impact of supersonic flight, *without leaving the laboratory*. Extremes of altitude, temperature, and humidity will yield their secrets to special equipment and instruments made by Bowser Technical Refrigeration of Terryville, Connecticut. To make possible the many unusual design features, to assure maximum strength with minimum weight, Bowser engineers specified that the complex shell be fabricated by Acme Welding . . . one more dramatic example of the part played in industry today by Acme weldments. Perhaps an Acme weldment can improve your product. Why not call on Acme today.

STEEL • STAINLESS STEEL • EVERDUR • ALLOYS

A.S.M.E. U68-U69 Qualified Welders • A.P.I. - A.S.M.E. Approved  
Underwriters Label and Inspection Service • Navy Approved  
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**Acme WELDING**  
DIVISION of THE UNITED TOOL & DIE CO.

Send us your blueprints for a prompt quotation and ask for our informative folder, ACME PLANNED WELDMENT FABRICATION.

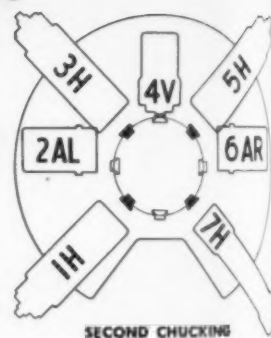
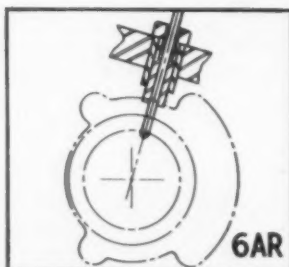
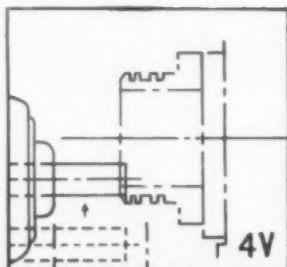
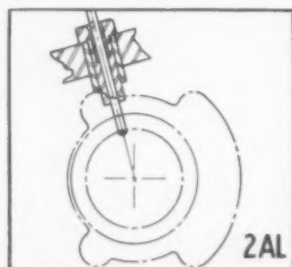
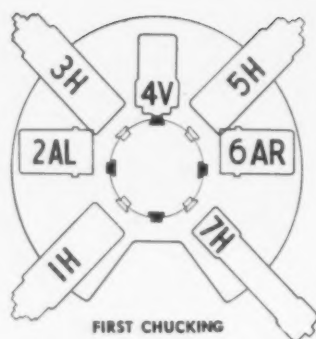
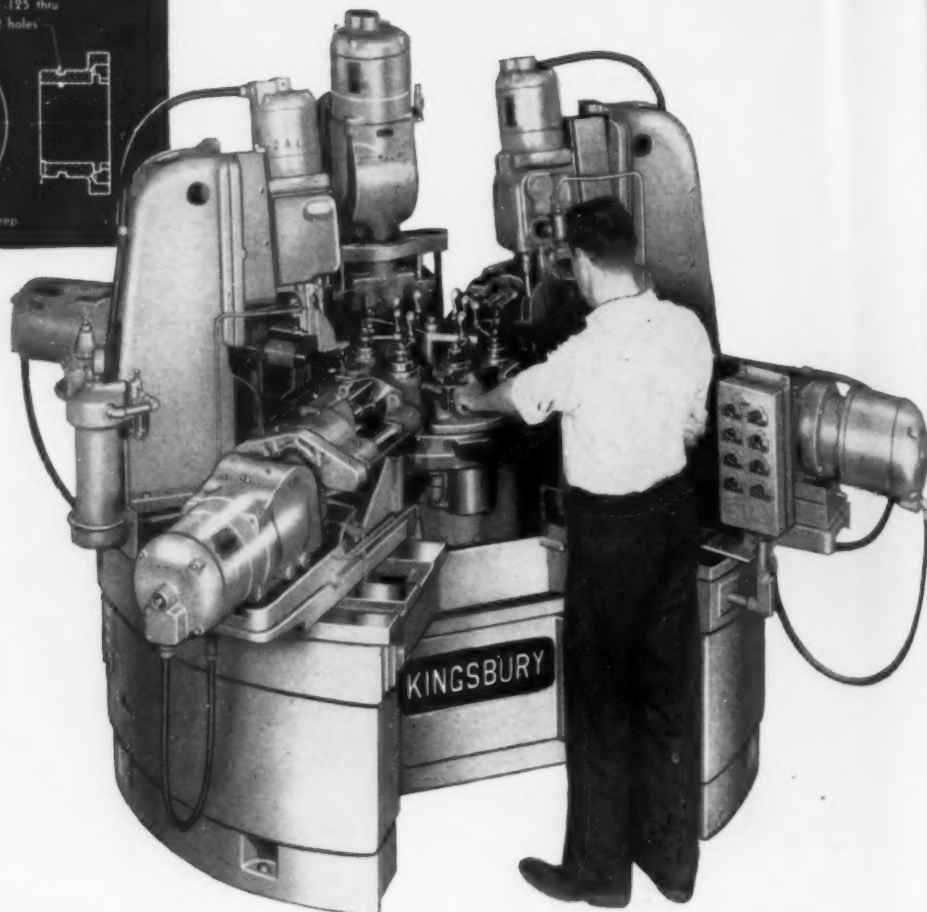
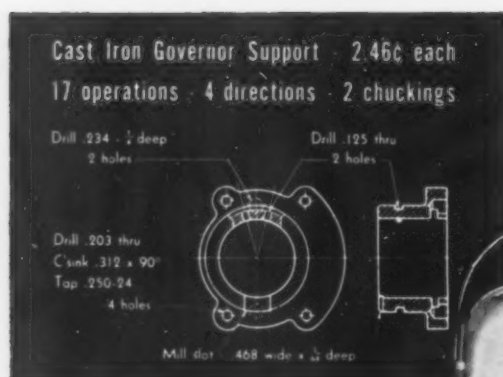
1044 New Britain Ave. • West Hartford 10, Conn.

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National Representative TRANSMISSION EQUIPMENT CO., Inc. • 441 LEXINGTON AVE., NEW YORK 17, N. Y.



# "Operations Kingsbury"



## Follow this Kingsbury Automatic Machine as it performs

**Actually better than that!** It drills 8 holes, c'sinks and taps 4 of them, and mills a slot at the rate of 218 pieces per hour gross.

The part is a cast iron governor support small enough to palm in your hand. Print calls for 8 holes and a milled slot — 17 operations from 4 directions. Three operations are required at one end of the piece and 14 operations at the other. It was decided to accomplish these on one machine in two chuckings.

The machine has an 80-inch base with seven working units: four Horizontal Units (H), one Vertical Unit (V) and two units operating downward at an angle (AL left and AR right). The 30-inch Index Table

has eight fixtures, four for each chucking. By means of selective tripping, the first chucking operations are performed at Stations 2, 4 and 6; the second chucking operations are performed at Stations, 1, 3, 5, and 7.

### First Chucking

**Station 2:** Unit 2AL drills .125 hole through at angle 15° left.

**Station 4:** Unit 4V mills slot .468 wide x 5/64 inch deep through wall of part.

**Station 6:** Unit 6AR drills .125 hole through at angle 15° right.

# produces interchangeable parts at low cost

"Operations Kingsbury" will provide you with parts of uniform accuracy . . . parts which will slip into your assemblies without reworking. Your part can be of any material that can be machined within the limits of 5 HP units and handled by one operator.

This broad claim is based upon field experience with more than 4,000 custom-built Kingsburys; a plant equipped with the most modern machine tools; a staff of experienced engineers and craftsmen specializing in this one line; and pride in doing it well.

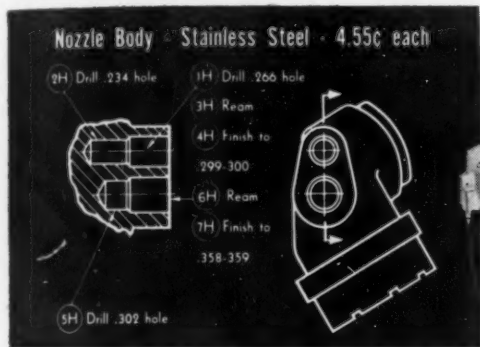
Accuracy begins at home. Precision-built work-holding fixtures locate the part correctly for each tool.

Precision ball bearings and bushing guides insure close tolerances. Predetermined feeds and speed are uniform and constant: multiple spindle heads are used only when it is safe to do so.

"Operations Kingsbury" offer additional money-wise advantages. Your scrap loss will be reduced to a minimum. You'll save floor space, set-up time and intra-machine rehandling.

Are you a good prospect? If so, we should like to see you.

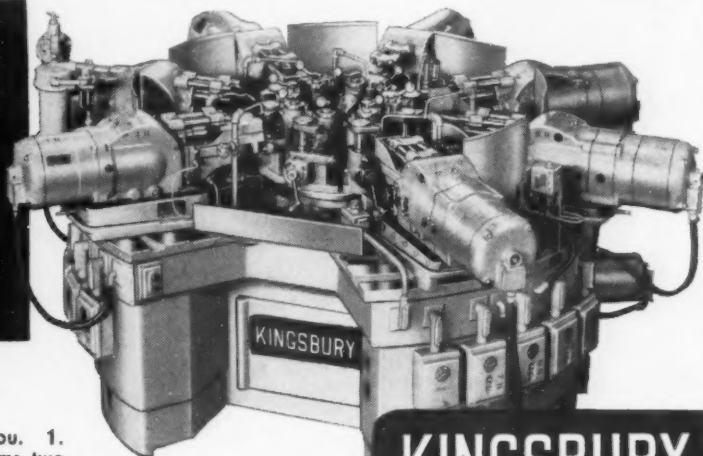
Kingsbury Machine Tool Corp.  
106 Laurel Street, Keene, N. H.



## Stainless Steel Nozzle Body 21 operations per minute

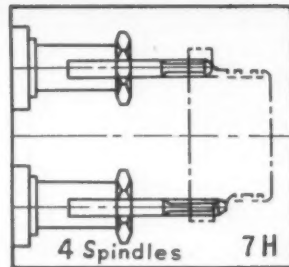
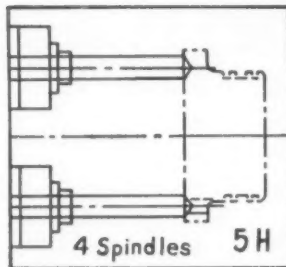
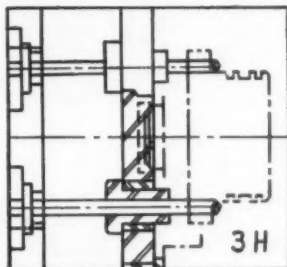
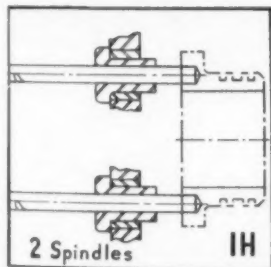
This Kingsbury holds three points of interest for you. 1. It drills stainless steel at 66 FPM. 2. It finish-reams two holes to  $\pm .0005$  on diameters. 3. It averages 1,274 operations per hour, producing 182 pieces gross.

The machine has an 80-inch base with seven horizontal work units, all radial. The 24-inch index table has eight work fixtures, one for loading and unloading; and indexes clock-wise through 8 stations. Bushings guide all drills and reamers.



# KINGSBURY

**AUTOMATIC DRILLING  
AND TAPPING MACHINES**  
for Low-Cost High Production



# 17 operations at an average of one every second!

## Second Chucking

Operator removes part and reloads with a new part placed end for end in work fixture as shown in the plan view.

**Station 1:** Unit 1H with two-spindle head drills two .234 holes  $\frac{1}{4}$  inch deep.

**Station 3:** Unit 3H with four-spindle head drills four .203 holes through.

**Station 5:** Unit 5H with four-spindle head c'sinks .312 x 90° the four holes drilled at Unit 3H.

**Station 7:** Unit 7H with four-spindle head taps the four holes with .250 — 24 Taps.

Parts for both chuckings are loaded and unloaded at eighth position during machining cycle. Bushings guide all drills.

## Each Unit Cost on the drawings

includes the cost of the man and of the machine — no power or overhead. We assumed:

Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross} \times 80\% \text{ efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$



# CALL FARREL® FOR

Pick up the phone . . . to take advantage of close to a century of experience in supplying rolling mill equipment for the solution of specific production problems.

**FARREL MILLS** are built in a wide range of sizes for rolling nonferrous rods, strips or sheets, metal foils and cold strip steel. Farrel also designs and manufactures boilers and special handling equipment required to make each installation a complete production unit.

**FARREL MILL DRIVES, PINION STANDS AND COMBINATION UNITS** are specially designed to suit individual requirements. Single, double and multiple reduction gear units are available in a wide range of ratios and capacities. Pinion stands with single or double helical pinions are built in any size, for any capacity. Combination units include reduction gear drive and pinion stand in a compact, integral housing.

**FARREL ROLL GRINDERS** are available in two types and nine standard sizes. These machines grind rolls with a perfect surface, free from marks of any kind, either straight, or with concave or convex contours of exact symmetry and accuracy.

*Ask for descriptive bulletins. No cost or obligation.*

## FARREL-BIRMINGHAM COMPANY, INC.

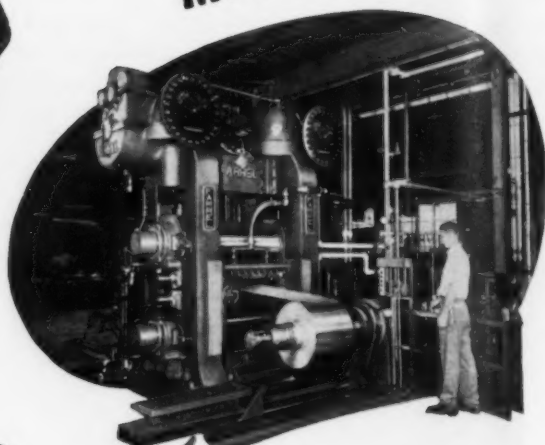
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Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

# Farrel-Birmingham®

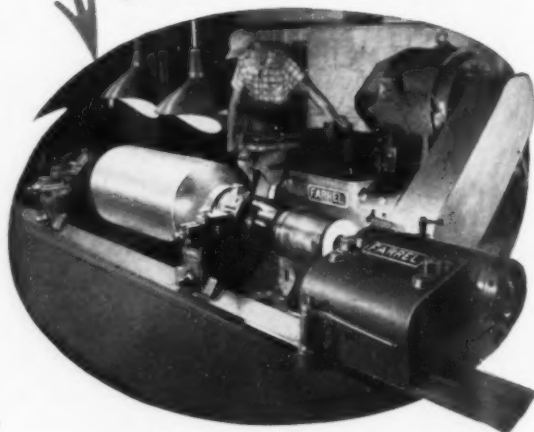
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MILL DRIVES



ROLL GRINDERS







## Use Brass or Bronze?

If your problem is pressing...or forming...

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sheet...strip...mill coils...or cut to length.

Check with us for immediate  
recommendations from your  
samples or specifications...

*Brass*

SHEET, STRIP • FORMED, FABRICATED



THE *PLUME & ATWOOD* MFG. CO.

Main Office and Fabricating Div.: 540 Bank St., Waterbury, Conn.  
Mill Div.: Thomaston, Conn.      N. Y. Office: 220 Broadway

June 24, 1954

# New Britain's Precision

## CAM



New Britain's exclusive application of cam control (illustrated diagrammatically on the opposite page) gives your tool engineer a completely new approach to tooling for complex pieces. Methods impossible on other types of machines can be employed to speed production and eliminate second operations.

A New Britain precision boring machine will not only turn out a wide variety of work at high speeds,

but, because of cam actuation, will continue producing them with the same repetitive accuracy — piece after piece, week after week.

Write for descriptive literature on the New Britain boring machine line, including the details of a variety of specific parts turned out on New Britains.





**Pioneer**

**in a pioneer New England Industry**

A few interesting and significant dates in Scovill and New England metal-working history:

1802. Establishment by Abel Porter and his partners of the little metal-button shop in Waterbury from which the present great Scovill Brass and Aluminum Mills directly descend . . . believed the scene of the first commercial brass bar casting operation in America.

1889. Scovill pioneers in rolling and fabrication of aluminum . . . recorded among the first commercial ingot customers of Pittsburgh Reduction Company (now Aluminum Company of America).

1938. Scovill pioneers large-scale commercial introduction of Continuous Brass Casting in the United States.

1949. Scovill inaugurates production in the world's most modern brass continuous strip mill.

When you fabricate from the fine Mill Products produced by Scovill's pioneer metal craftsmen . . . you can SELL the difference.

Scovill Manufacturing Company  
Mill Products Division  
Waterbury 20, Connecticut



**SCOVILL**

**BRASS**

**BRONZE**

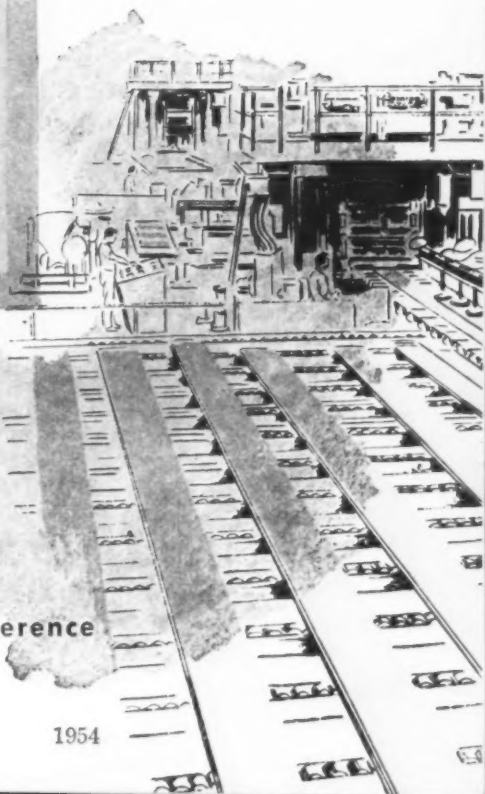
**NICKEL-SILVER**

**ALUMINUM**

**You Can SELL the Difference**



1802



1954



# ANACONDA METALS AT WORK

A special alloy wire goes into the G-E SLEEP-GUARD Blanket  
... sheet brass into the Westinghouse Thermometer Set  
... and Everdur Copper-Silicon Alloys into  
the Sherwood Valve.



## A million at one clip for Betty

Anyone who's ever settled down before a TV set needs no introduction to charming Betty Furness of Westinghouse Studio One fame. Betty's currently offering her vast viewing audience this handy Westinghouse Kitchen Thermometer Set at a bargain price. And Westinghouse expects an overwhelming response. That's why they had Chaney Mfg. Co., Springfield, Ohio, make a million of these sets at one clip. And speaking of clips, those attached to these thermometers are made of coiled brass strip in the most economical alloy, gage and temper.

## Want more information?

Our Technical Department's wide range of experience covers virtually the entire field of copper and copper-alloy applications in industry. If you have a problem of metal selection, we are at your service. *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.*

\*Reg. U. S. Pat. Off.



## Shut-eye's safer with new shut-off control

Ahhh, sleep... it's wonderful! And now because of G. E.'s new SLEEP-GUARD Wiring System—made of two spiral wires separated by a nylon sheath—sleep's safer, too. If the heating wire becomes too warm, the nylon sheath—along with the heater and signal wire—automatically turns off your blanket. Both wires are made of Hitenso\*, a cadmium bronze which provides just the right electrical and mechanical properties. We process almost 100 copper alloys into wire in a wide variety of sizes and shapes, tempers and finishes.



## Vive le valve plug!

The Aluminum and Brass Co., Lockport, N. Y., calls this valve plug—which employs a nylon insert and operates under pressures up to 3,000 psi—the "heart" of their Sherwood Oxygen Valve. We're mighty proud about their enthusiasm, since the plug is made of one of our Copper-Silicon Alloys. Everdur\*-1015 was chosen because roll-threading not only frees it from burrs but also work-hardens its surface, making it less likely to wear, gall or "freeze." Everdur-1015's cold-working properties also allow it to be rolled over the nylon insert. A tight "cap" results.

# ANACONDA®

the name to remember in  
COPPER • BRASS • BRONZE

# Waterbury Farrel's New, ONE-PIECE

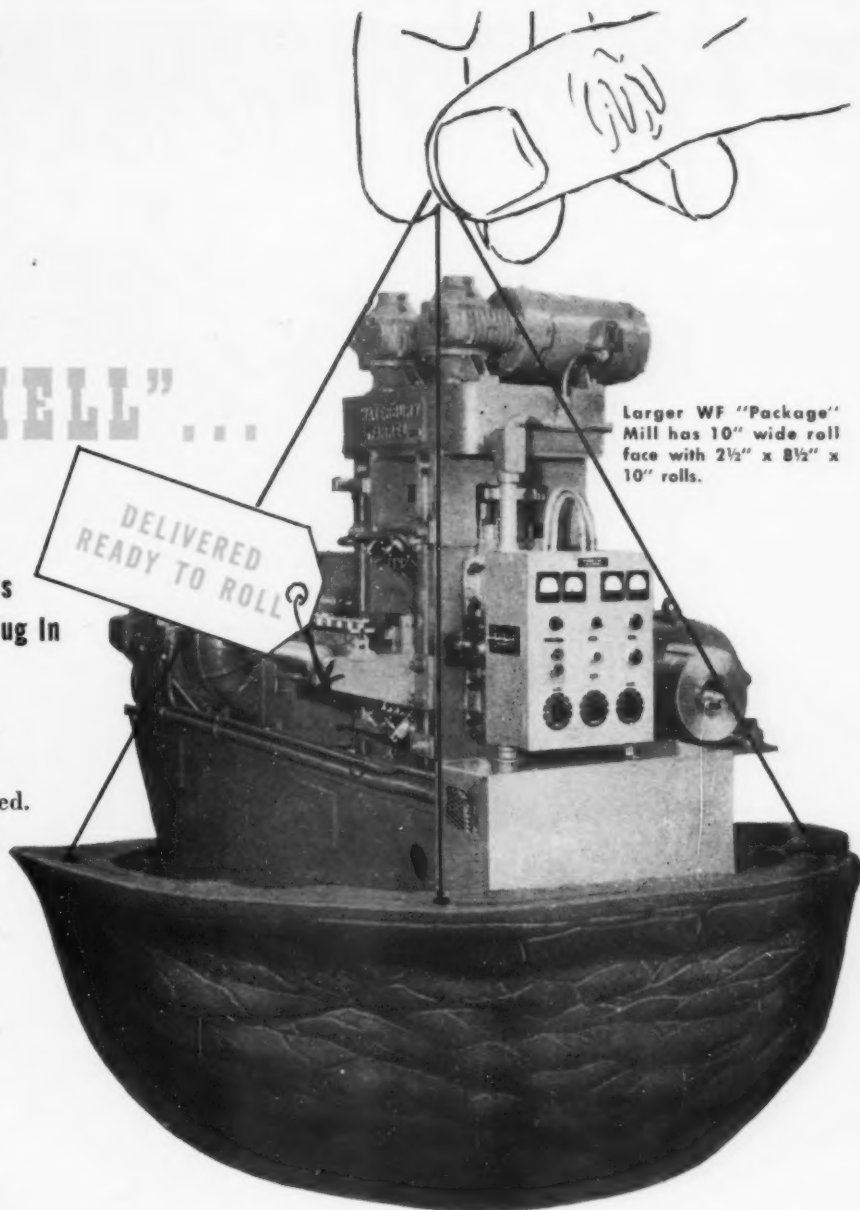
## STRIP MILL "IN-A-NUTSHELL"...

WF's 4-High "Package" Rolling Mills  
Are Compact, Low Cost, Ready To Plug In

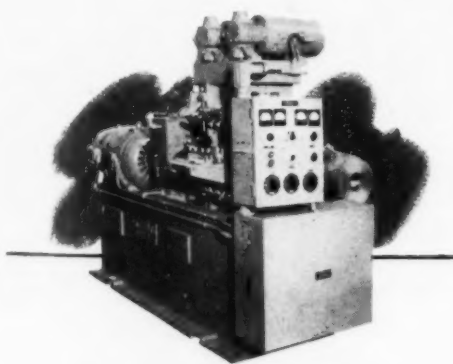
You can start precision-rolling  
ferrous or non-ferrous strip as soon as  
you plug in the electrical connection.

This mill is completely self-contained.  
Drive, gear case, controls, lubrication  
system, winder and winder drive  
are assembled with the mill, itself,  
into a single, compact unit.

When necessary, it can easily be  
moved in one piece to a new location.



Larger WF "Package"  
Mill has 10" wide roll  
face with 2½" x 8½" x  
10" rolls.



Smaller WF "Package" Mill has 6" wide  
roll face with 1½" x 6½" x 6" rolls.

**Some Construction Features:** Mill frame of unit welded plate steel gives maximum strength and rigidity . . . assures greater accuracy and lasting alignment . . . alloy steel work rolls mounted in needle bearings . . . alloy steel back-up rolls drilled for water cooling, mounted in double row Timken bearings with tapered sleeve . . . independent power screwdowns . . . long and short roll necks and staggered couplings permit heavier construction for maximum torque capacities . . . lucite cover on welded steel gear case facilitates inspection . . . variable speed tension control drive, using AC power, cuts control cost and permits compact panel.

Contact Waterbury Farrel for complete details. No obligation.

**WATERBURY FARREL FOUNDRY & MACHINE CO. • WATERBURY, CONN.**

Offices: Chicago, Cleveland and Millburn, N. J.

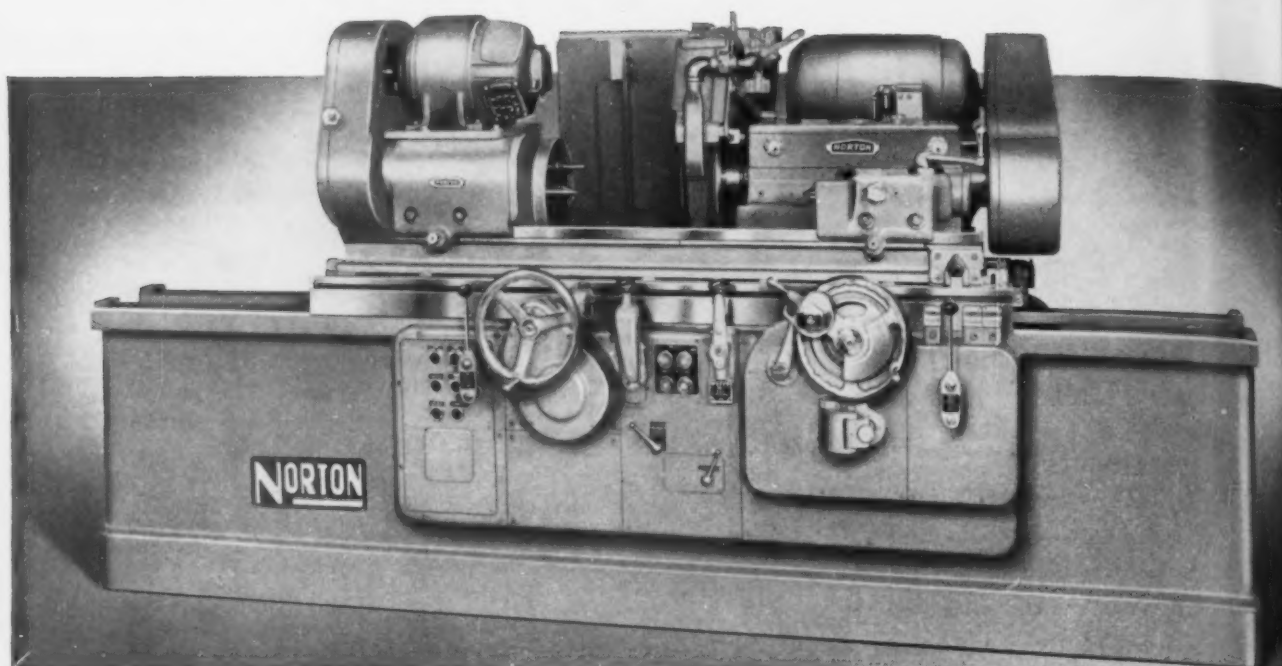
### A FEW OF THE MANY TYPES OF METAL WORKING MACHINERY MADE BY WATERBURY FARREL

**MILL MACHINERY**—Rolling Mills: Strip, Rod, Wire Flattening, (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc. **WIRE MILL EQUIPMENT**—Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Painters Swagers • Bull Blocks • String-up Machines • Spoolers, etc. **COLD PROCESS BOLT & NUT MACHINERY**—Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc. **POWER PRESSES**—Crank, Cam and Toggle; also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc.



WF-17

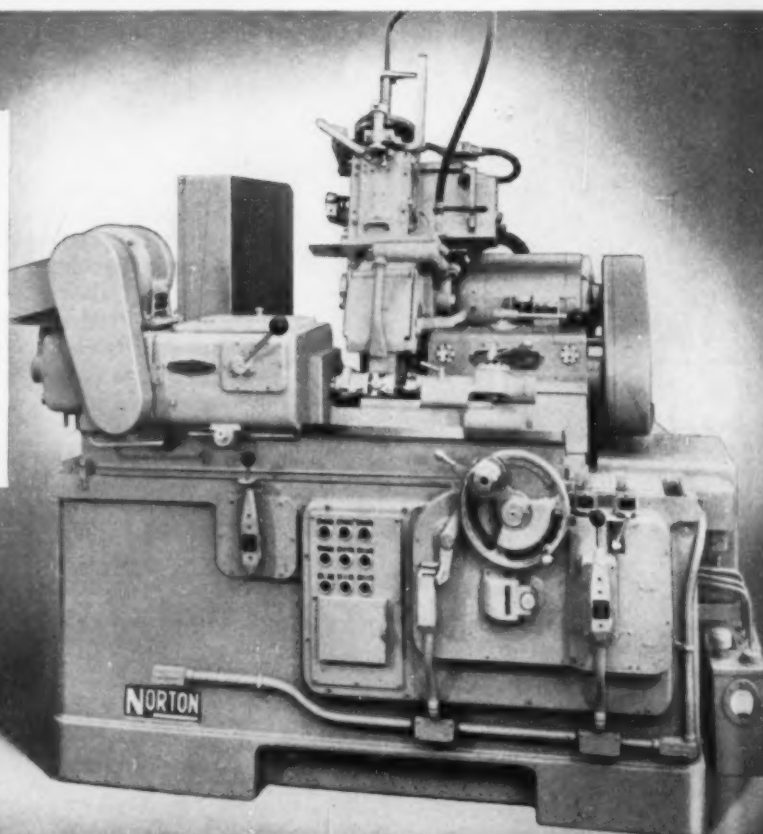
# 6 from the world's most



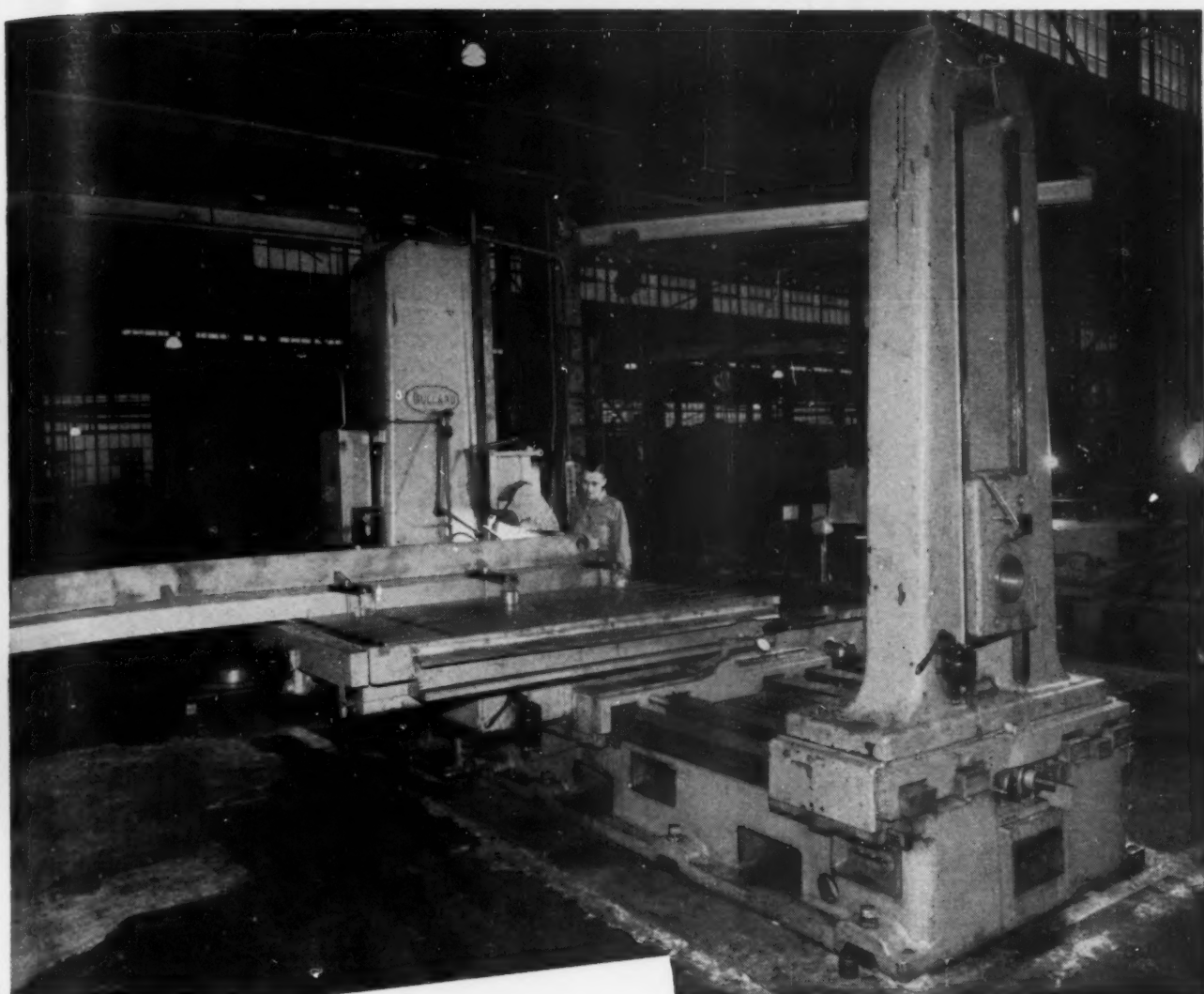
○ *Norton General Purpose Production Type Cylindrical Grinders.* The 10" x 36" Type CTU Semi-automatic, a top performer among grinding machines of this type, offers a unique combination of speed, accuracy, flexibility and sturdiness. One-lever control of the auto-

matic grinding cycle reduces operator's duties to loading and unloading. Production line and job shop users report Norton 10" CTU's have doubled production, replaced several machines, eliminated extra operations. Write for Catalog 1787.

○ *Norton Special Purpose Grinders For Automotive Parts* include the 6" x 8" Semi-automatic Piston Grinding Machine, outstanding for high production and high precision. Fast sizing, automatic wheel truing and simplified operation are among the many advanced features. Work drive arrangements available for all types of piston relief grinding. Catalog 742 gives full details.







... REPLACEMENT

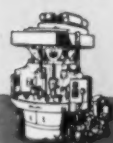
*Strategy*

BULLARD

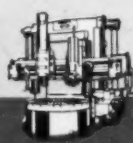
### FOR OUTMODED MACHINES

With keener competition and manufacturing costs increasingly important, new products, methods, materials and cutting tools have made it necessary to reevaluate standards of present day procedures. Modern tools such as the Bullard Horizontal Boring, Milling and Drilling Machines are designed and built to give you full advantage of these modern developments insuring maximum performance, accuracy and dependability for years to come.

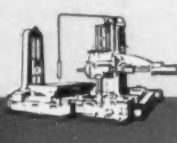
*Ask your Bullard representative to call and explain its application to your work or write to*



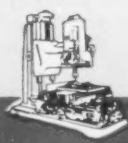
CONTIN-U-MATIC



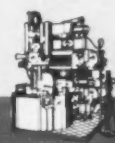
CUT MASTER



HORIZONTAL BORING



SPACING TABLE

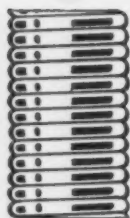
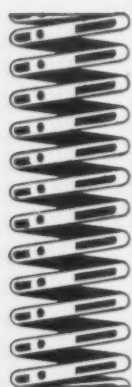


MAN-AU-TROL

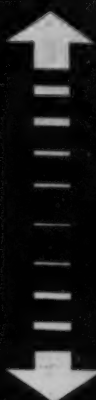
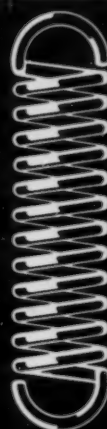
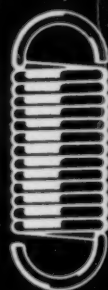


MULT-AU-MATIC

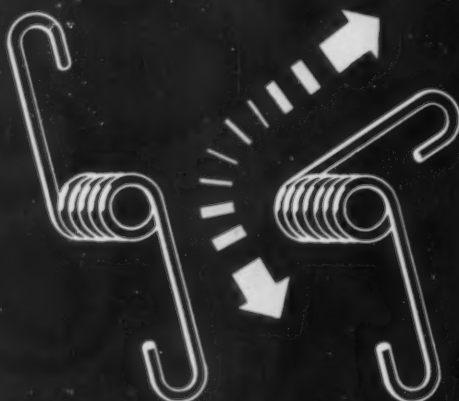
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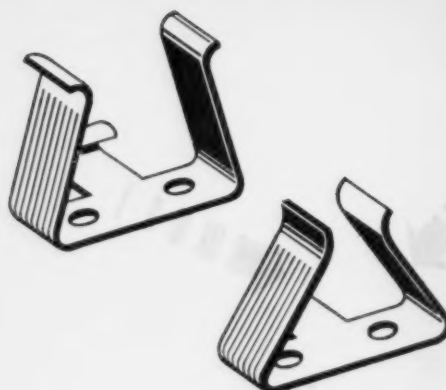
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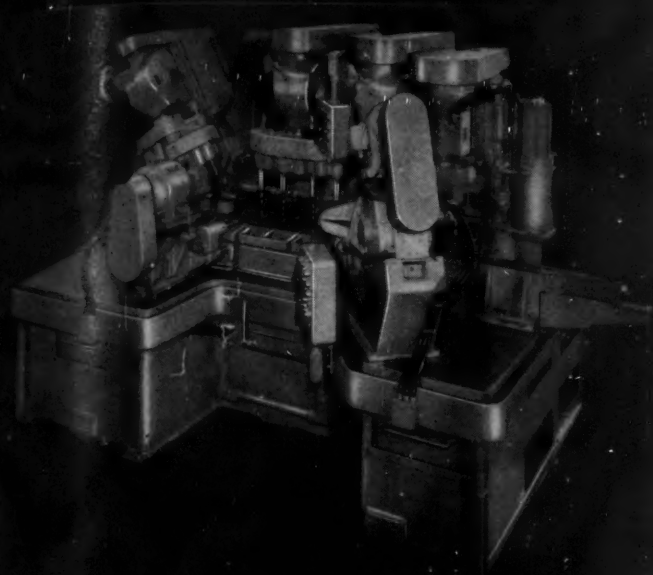
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#### AUTOMATIC DRILLING & TAPPING MACHINES

of the Transfer type provide maximum automation for multiple operations. Hartford Special's custom engineered features assure top efficiency and economy in high production. For the best buy in the long run consult Hartford Special — new, detailed bulletin available on request.

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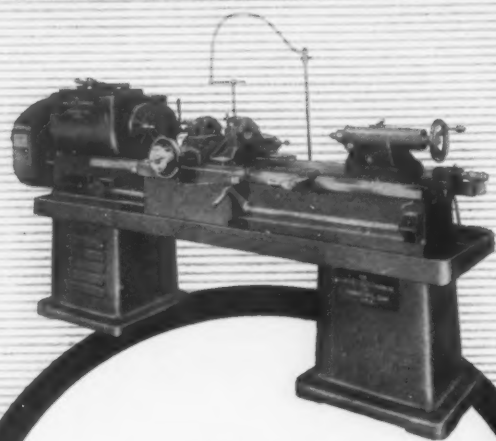
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THE HARTFORD SPECIAL MACHINERY CO.  
HARTFORD 12, CONN.



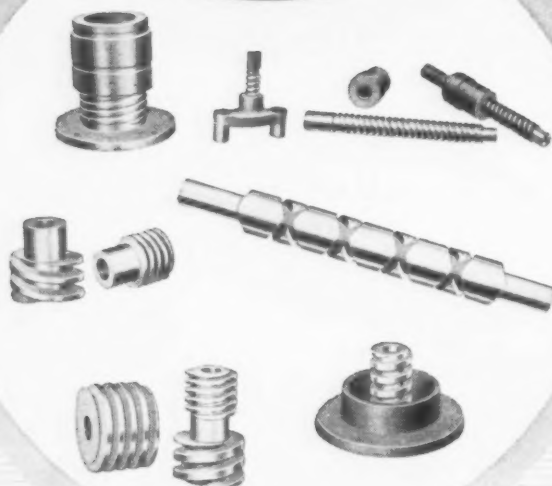
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... is so versatile  
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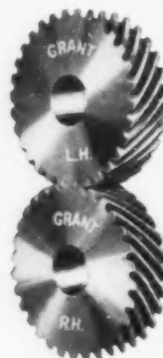
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BUILDERS  
Since 1896

# Grant STOCK GEARS for UNIFORM ACCURACY



*the proof is  
in the use!*



Make a comparison test ...  
Grant stock gears against those  
you now use. You'll find Grant  
Gears more accurate, uniformly  
the same, whether you use two  
or two hundred.

This better quality starts with  
top-grade gear blanks, cut and  
machined by workmen skilled  
in precision gear making; fol-  
lowed by rigid inspection for  
concentricity, hole size and fin-  
ish. Result: Every gear has the  
extra quality that means trou-  
ble-free service for your ma-  
chinery.

Grant stock gears are available in a wide  
variety of sizes and materials, ready for im-  
mediate delivery.

**STOCK GEARS**

**SPECIAL GEARS**

**SPECIAL REDUCERS**



The full Grant line is described in the new catalog recently  
issued. Write for your copy today!

# GRANT GEAR WORKS INC.

171 West Second St., Boston 27, Mass.

Founded in 1877 by George B. Grant the Pioneer Gear Man

**In the Heart of Industrial New England**



***128 YEARS***  
***of EXPERIENCED SERVICE***  
***to world-wide markets***

WORCESTER

FROM THE HEALD PLANT here in Worcester, Massachusetts, precision production reaches out across the Nation—even to the far corners of the earth. For the precision finishing machines produced here—developed and perfected through more than a century of specialization—are speeding production and cutting manufacturing costs throughout the entire metal-working industry.

Built with the traditional skill of New England craftsmen, Heald Bore-Matics, Internal Grinding Machines and Rotary Surface Grinding Machines have continually set the highest standards of accuracy, speed and precision. If you are looking for new ways to improve product quality and cut costs, we may have the answer. Long runs or short, single or multiple operations on simple or complex parts, Heald precision will fit right into your production and profit picture.

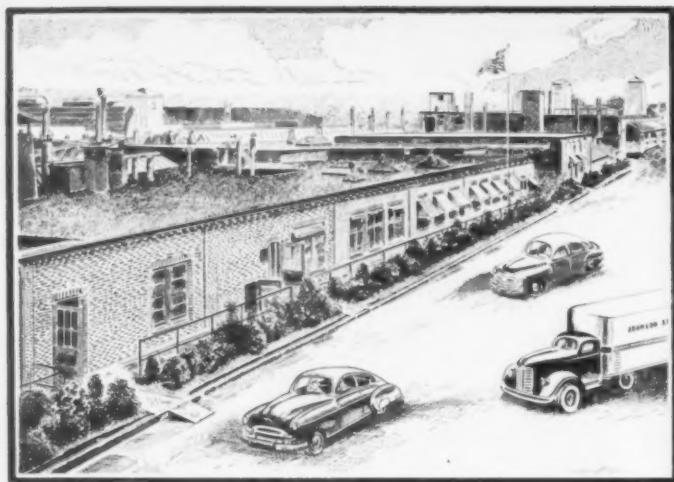
Remember — when it comes to precision finishing, it pays to come to Heald.



**THE HEALD MACHINE COMPANY**

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton  
Detroit • Indianapolis • New York



Main Offices and Plant of  
Johnson Steel & Wire Co., Inc.  
at Worcester, Massachusetts

## JOHNSON is proud of New England..

From a one-frame beginning, October 26, 1926, the business of Johnson Steel & Wire Company, Inc. has expanded progressively year by year. The modern Johnson plant in the Quinsigamond district of Worcester, Mass., where commercial wire drawing was pioneered, produces a wide range of types of high quality high carbon wires under scientific supervision, from the raw material to the finished product.

The Johnson laboratories are equipped with the most modern instruments to determine quality and precision, and are manned by scientists. Scientific chemical and physical analyses are employed to control quality, beginning with the selection of the best material for each product and carrying on with control of processing operations, such as heat treatment, die traction, special lubricants used in wire drawing. The laboratory also carries on research into best types of wire for specific problems, the development of better lubrication, improved heat treating and processing.

Along with the laboratory control, sales engineering men go afield to consult users of wire and determine their specific requirements, submitting this information to the laboratory for research and development of better products for customers' needs. The Johnson products may be summed up generally as the highest grade steel wires used for such purposes as important parts of aircraft, automobile tires, textile machinery, dental apparatus, wire rope and countless other uses where high grade wire is essential.

Johnson pioneered the development and improvement of tire bead wire, a notable

Johnson advance being bronze plated wire which gives the closest bond between rubber and steel. In fact, the adhesion exceeds the strength of the wire, eliminating tire bead failures which were not uncommon in early tires. This product has recently been made available for reinforcement of vacuum and defroster hose.

During World War II, wires were developed for the widening field of electronics, and large quantities of signal corps wire, a Johnson development, were produced for the fighting forces.

Perhaps the best known of the many Johnson wires is Johnson XLO Music Spring Wire, "the wire of a thousand uses," which is produced in two hundred different sizes, ranging in sizes from over seven miles to the pound to nine feet to the pound. Much of this wire is sold in packages containing  $\frac{1}{4}$  pound and up.

Johnson's confidence in New England has led to large expenditures for plant improvement during the last year.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

### JOHNSON SPECIALTY WIRES

Made in New England . . . by New England  
Craftsmen . . . for use throughout the world

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

**JOHNSON STEEL & WIRE CO., INC.**  
Worcester, Massachusetts





## “He who makes no mistakes does nothing”

In a supposedly modern era it is sometimes claimed to be “smart business” to let a competitor take the lead and make profit from his mistakes. Obviously, if all business adhered to such a philosophy there would be no progress, if any business. “He who makes no mistakes does nothing”. Cone leadership was founded — and is maintained — by active service, by doing things.

The Conomatic Carbide Development program expects to make a few mistakes. But, loss or gain, its efforts will contribute to the general benefit of all “automatic” users, users on whom all “automatic” builders are dependent.

The job illustrated compares actual production runs with HSS and 100% carbide tooling. It suggests the kind of pioneering that is being done at Cone.

Full details are available.



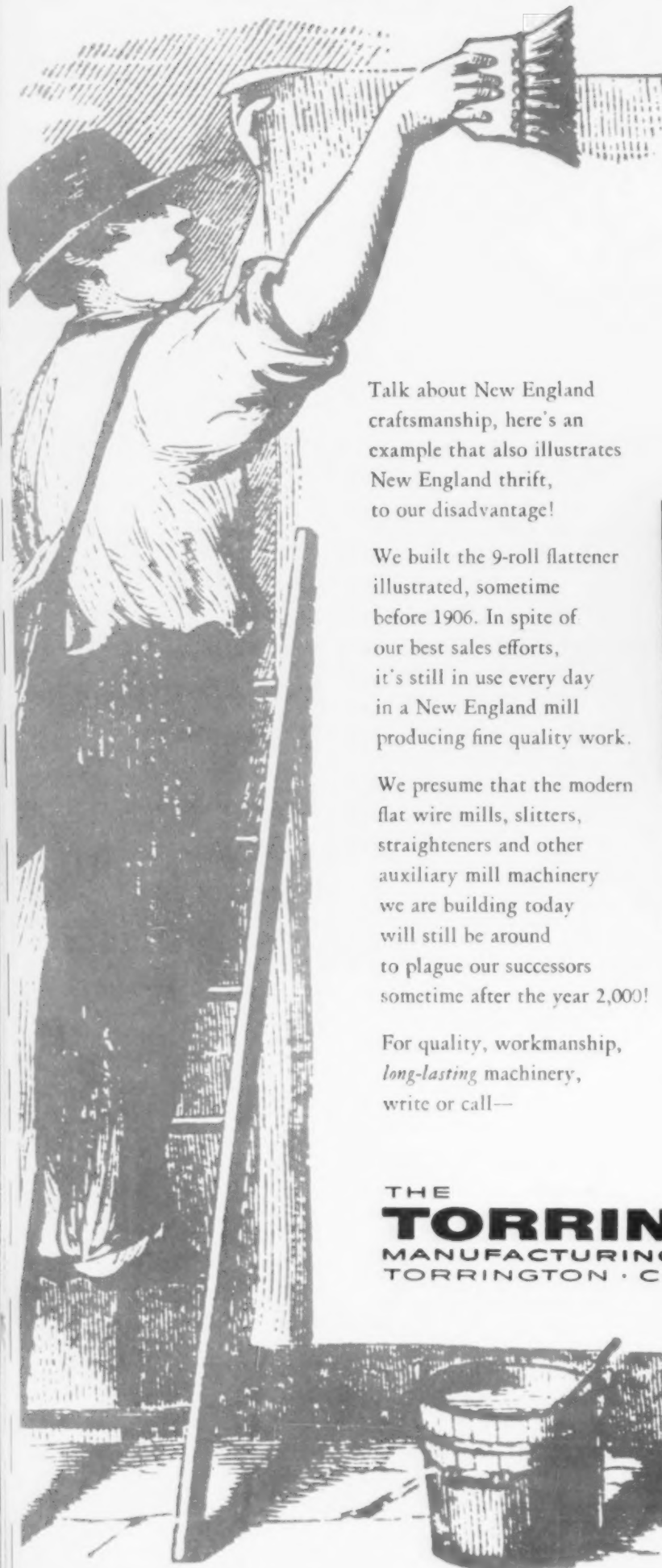
MATERIAL—1112 STEEL: Hole drilled with 1" dia. drill to 2 3/4" depth. OD threaded to 2" length with 1 1/4"—12 chasers.

	HSS	CARBIDE
Cycle Time	90 secs.	15 Secs.
Work Spindle Speed	370 R.P.M. at 103 S.F.	1500 R. P. M. at 417 S. F.
Tool Wear	1500 pcs. per grind	5000 pcs. per grind



# Conomatic }

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
WINDSOR, VT., U.S.A.



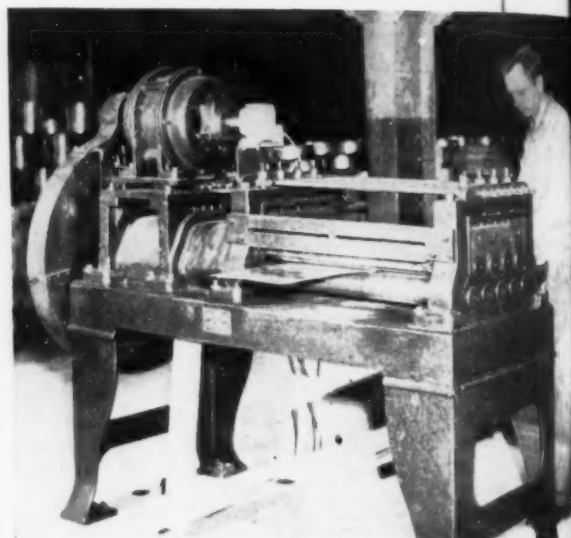
## They Just Won't Throw It Away

Talk about New England craftsmanship, here's an example that also illustrates New England thrift, to our disadvantage!

We built the 9-roll flattener illustrated, sometime before 1906. In spite of our best sales efforts, it's still in use every day in a New England mill producing fine quality work.

We presume that the modern flat wire mills, slitters, straighteners and other auxiliary mill machinery we are building today will still be around to plague our successors sometime after the year 2,000!

For quality, workmanship, long-lasting machinery, write or call—



*Nota Bene: We've only been building spring coiling machines since 1937, but (1) we've already built more of them than all other manufacturers of spring coilers combined, and (2) professional springmakers buy more for expansion than for replacement!*

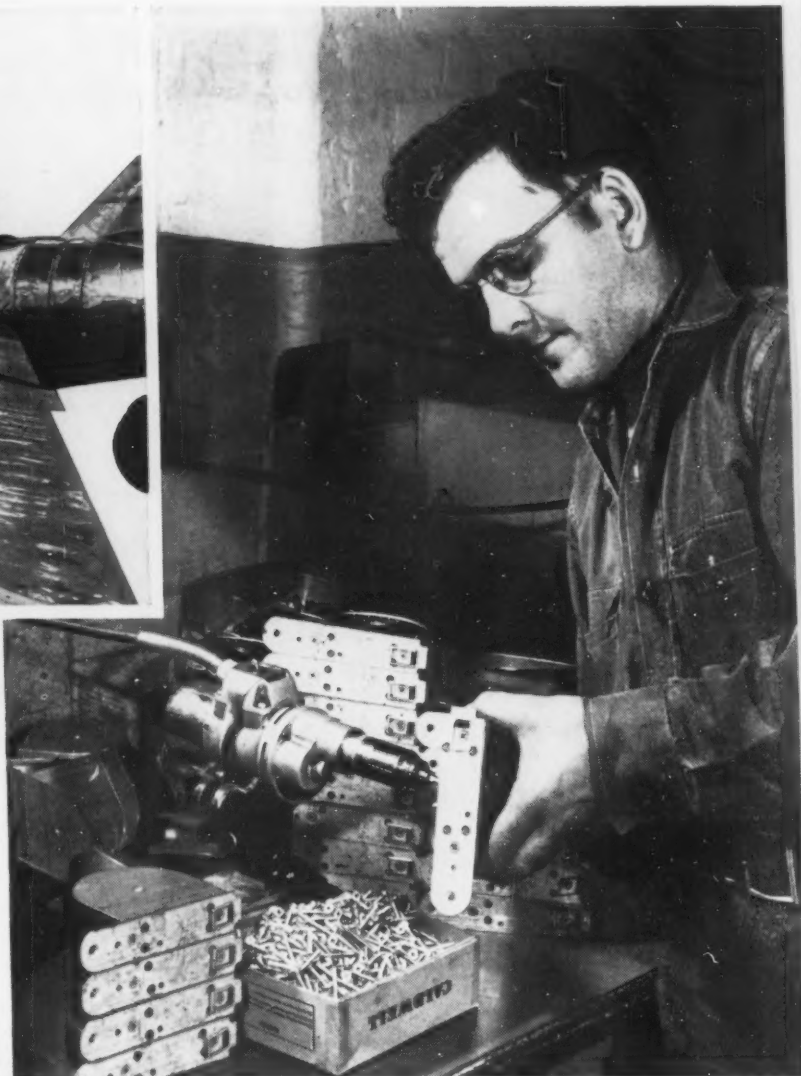
13 sizes: Catalog and quotation on request

THE  
**TORRINGTON**  
MANUFACTURING COMPANY  
TORRINGTON · CONNECTICUT

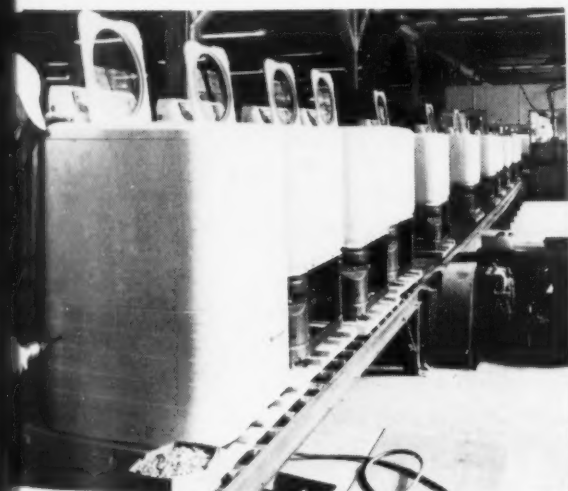
# Users praise Phillips Cross-Recessed-Head Screws



**REPUBLIC AVIATION** finds the speedy, tight fastening of recessed head screws invaluable. On access plates, for instance, through which the plane is serviced and repaired, such screws are essential. Servicing of components is done many times and easier if such screws are used on access covers. Raymond Whalen fastens wing tip covering foreground, while B. Broman installs access plates using Phillips type recessed head screws.



**PRODUCTION IS SPEEDED ON CALDWELL WINDOW SASH BALANCES** due to Phillips screws. "Our power drivers are mounted horizontally," points out Kenneth Meyers, production manager, "and, before using Phillips screws, fast operators found it hard to engage screws immediately. Valuable time was wasted while the driver spun around uselessly. With Phillips screws, the screw assembly is now the quickest operation in the entire production schedule." Raymond Beecher here assembles the outer case of a Caldwell Sash Balance.



**APEX WASHING MACHINES** are designed for a minimum of 20 years service. "One reason our machines have such a long life," states William A. Haverlock, superintendent of assembly, "is the highly protective coating offered by the enameled finish. By using Phillips screws, we have eliminated the danger of scratching this finish. This results in considerable saving in refinishing — and eliminates production headaches caused by interruption of assembly line."



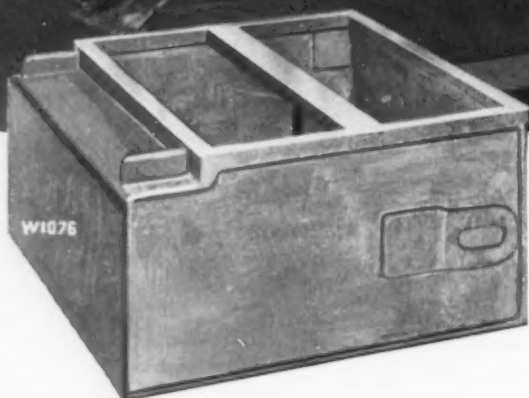
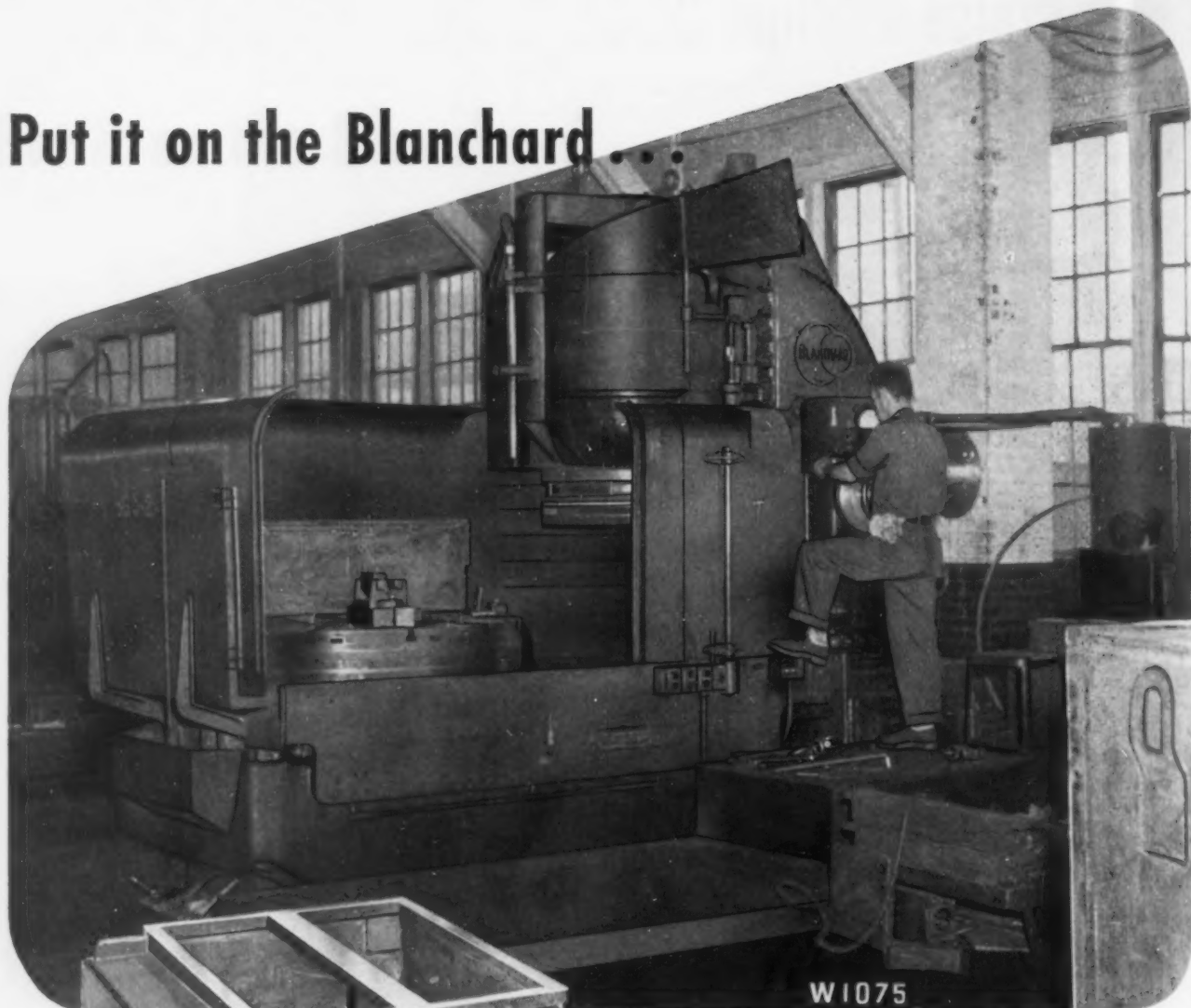
**THE FASTENERS  
OF TODAY...  
AND OF THE FUTURE**

**X marks the spot  
... the mark of extra quality**

American Screw Company • Atlantic Screw Works, Inc. • The Blake & Johnson Co. • Central Screw Company • Continental Screw Company • The Eagle Lock Company • Elco Tool and Screw Corporation • Great Lakes Screw Corporation • The H. M. Harper Co. • The Lamson & Sessions Company • National Lock Company • The National Screw & Manufacturing Co. • Parker-Kalon Div. General American Transportation Corporation • Pheoll Manufacturing Co. • Rockford Screw Products Co. • Scovill Manufacturing Co. • Shakeproof • The Southington Hdw. Mfg. Company • Sterling Bolt Company • Wales-Beech Corp.



# Put it on the Blanchard...



## it takes $\frac{1}{5}$ th the time!

Here is another example of the special jobs  
Blanchard Surface Grinders perform  
*in less time*, to exacting specifications.

These explosion-proof control cases are used in the coal  
mining industry. Each steel weldment case is 36" x 48" x 24" deep.  
Because gaskets cannot be used, surface finish, and flatness must provide a  
dust and gas explosion-proof metal seal.

A Blanchard Surface Grinder, the No. 32-60, removes approximately  $\frac{1}{8}$ " of stock — in *one-fifth*  
the machining time formerly required.

*Send a sampling of your parts for free test grinding and our recommendations.*

**PUT IT ON THE**

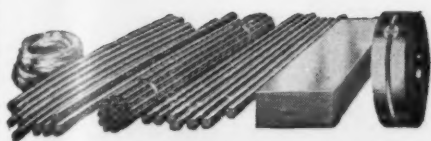


**THE BLANCHARD MACHINE COMPANY**

Send for your free copies of  
"Work Done on the Blanchard",  
fourth edition, and "Art of  
Blanchard Surface Grinding".



**64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**



BRIDGEPORT BRASS COMPANY

# COPPER ALLOY BULLETIN

BRIDGEPORT  
BRASS  
CO.

MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND. — IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL



Parts of  $\frac{5}{16}$ " diameter miniature volume controls used in hearing aids and in many other applications. Courtesy of Centralab, a Division of Globe-Union Inc., Milwaukee, Wisconsin.

## Copper Alloys Play Important Role In Miniaturization Trend

Throughout the electronics industry, the trend is to smaller, lighter, more compact assemblies. Hearing aids, for example, must incorporate all the elements of a radio amplifier in a package not much larger than the average cigarette case. Portable communications equipment like radio sets for aircraft and automobiles, miniature personal radios, walkie-talkie units, airborne radar receivers all must be designed so that every possible extra inch of space and ounce of weight can be trimmed off the finished product.

### Miniature Volume Control

Illustrated above with its copper-base alloy components is a volume control no bigger in diameter than a dime. This type of control has a rating of  $1/10$  watt and is obtainable with resistance ranges of from 0 to 500 ohms and on up through 10 megohms. It is probably one of the smallest volume controls commercially available. It is currently being used as a component in many hearing aids, test instruments, miniature radios, microwave sets and other miniaturized apparatus.

### Copper-Base Alloys Excellent for Precision Parts

Copper-base alloys are preferred for many electrical and electronic applications because of their fine properties. Conductivity, good corrosion resistance, ability to withstand severe forming operations, high wear resistance, excellent plating and finishing properties explain their wide use in the many thousands of products with which we are familiar.

Many of the parts in this control are made of brass. Some are plated with either nickel or cadmium for increased wear resistance or silver for improved contact characteristics.

Among the parts made from brass rod are the contact blade pivot pin, the mounting studs, the shaft, rivet, hex screw and nuts. The terminals were made from yellow brass strip which is easily stamped and formed. The spacers and washers were also made from brass.

### Phosphor Bronze Vital in Electronics Equipment

In complex assemblies like these volume controls and switches, satisfactory performance depends on each tiny part, especially those spring parts used in

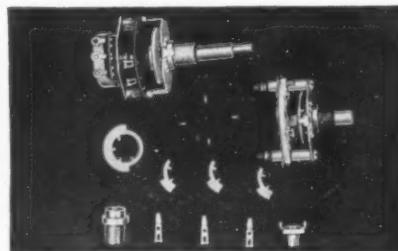
making mechanical and electrical contacts. For this reason, the selection of the correct alloy, temper, and gauge is most important.

The contact spring washer and spring pivot pin washer in the tiny volume control illustrated were made of Phosphor Bronze Grade C, approximately 92% copper, 8% tin, and 0.1% phosphorus. Supplied for these applications 8 B&S numbers hard, the material has a tensile strength of about 112,000 psi. It is widely used throughout the electronics industry because it combines superior spring properties as well as conductivity and high corrosion resistance.

Parts like contact springs must have high fatigue resistance to withstand millions of flexing cycles. Spring washers must withstand constant compression without taking a set if they are to be satisfactory. They must also be corrosion resistant under all climatic conditions. Phosphor Bronze meets all these qualifications and yet can be stamped and formed into precision parts. That is why Phosphor Bronze is in such wide use in the fields of radar, radio, television, sound reproduction and amplification, and in all types of electronic and electrical equipment and controls.

### Bridgeport Brass Service

Bridgeport Brass supplies copper-base alloys—in strip, rod, tubing, and wire—used in the electronics field. Our Laboratory will be glad to assist you in the selection of proper alloys for your applications. Write for Bridgeport Brass Technical Handbook for properties and applications of copper-base alloys. Call or write the Bridgeport District Office nearest you. (714)



Parts of electronic switch and assembled switches. Courtesy of Centralab, Milwaukee, Wisconsin.

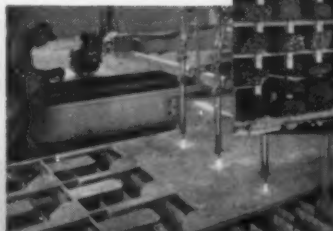
PLATE WAREHOUSE LOOKING ACROSS  
THE TRAVOGRAPH



GIANT CINCINNATI SHEAR

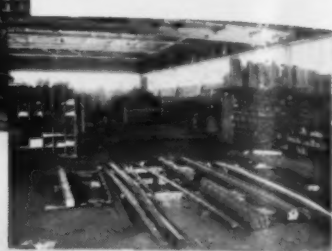


VIEW OF THE PLATE STOCK

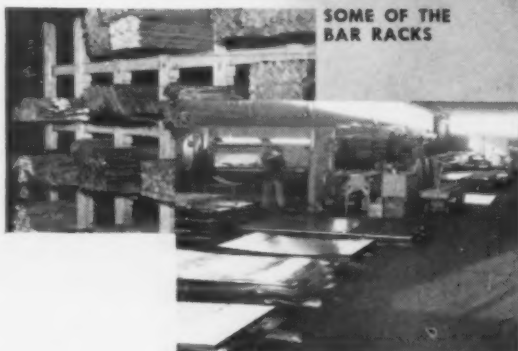


THE TRAVOGRAPH AT WORK

SOME OF THE  
OPEN-POCKET RACKS



ONE OF THE LOADING BAYS



SOME OF THE  
BAR RACKS

VIEW OF SHEET BAY AND NIAGARA  
SHEAR



FRICTION SAW ON THE JOB

# BROWN WALES *Steel*

*Serving New England Industry Since 1869*

With two new Warehouses now in full operation, Brown Wales offers New England industries double-barrelled service on steel and steel accessories that you will find it hard to equal. Throughout both Warehouses there is smooth-flowing efficiency of operation, and a most complete array of equipment to service your requirements exactly to specifications. Our flame-cutting equipment makes possible an accurate, clean-cut reproduction of intricate patterns—from small designs to an over-all size of 60 feet by 12 feet.

Our customers agree that it "pays to call Brown Wales first."

ALL IN THE DAY'S WORK FOR BROWN-WALES FLAME CUTTING

## BROWN-WALES COMPANY

ESTABLISHED 1869

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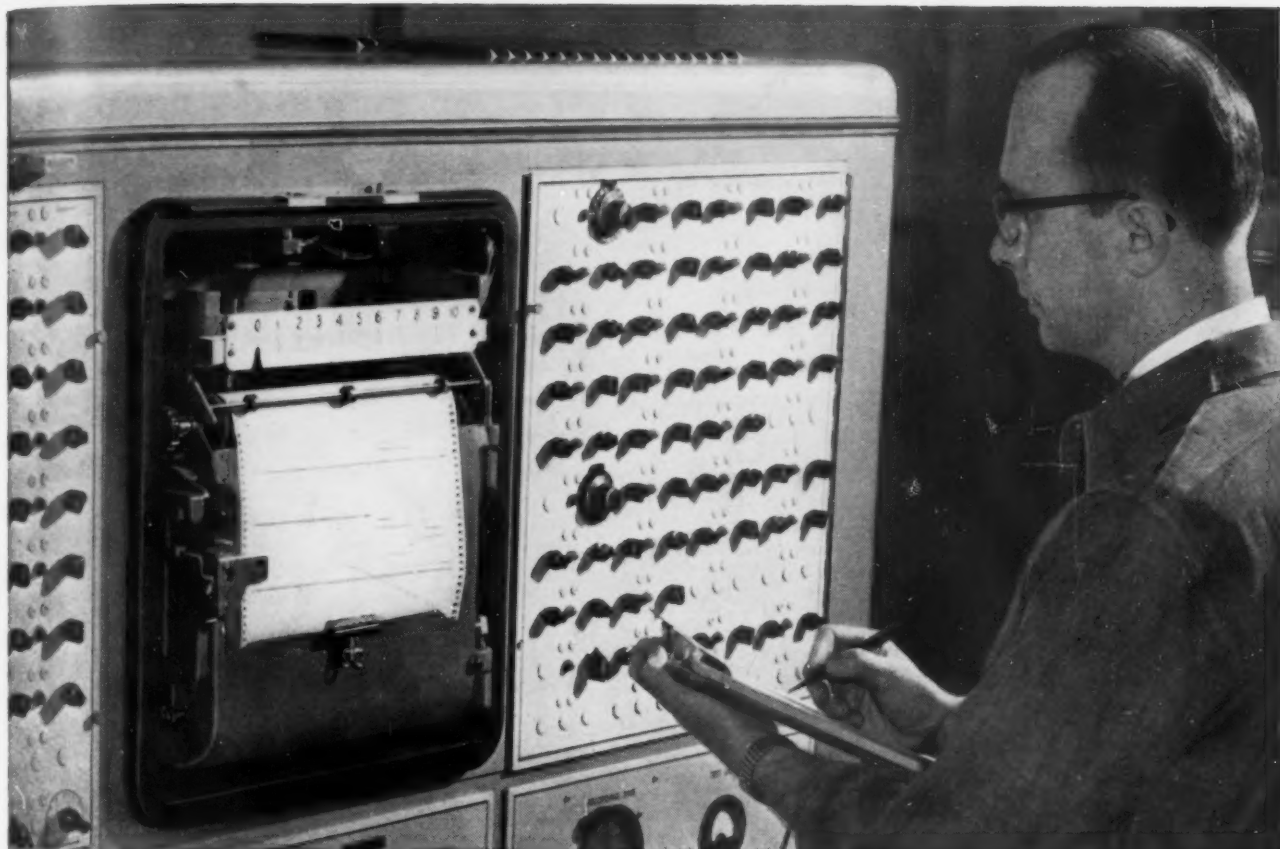
Lewiston-Auburn Warehouse  
AUBURN, MAINE  
Lewiston 4-5706

Branch Office  
HARTFORD 3, CONN.  
Jackson 7-8607



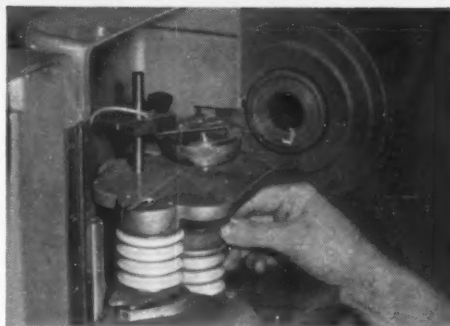


# **SURE, we're sure you're getting the right copper alloy!**



**CHASE** metallurgists use fantastically accurate instruments to check the brass shipped to you in wire, rod, sheet or tube. The Quantometer, for instance, tests a brass sample for 18 elements in 1½ minutes.

An Electron Microscope, Spectroscope, and an X-ray Diffraction Unit are also part of Chase laboratory equipment so that we can be absolutely certain that the Chase brass you buy has exactly the right composition, grain structure, temper, dimensions and other physical characteristics your product requires.



Here a brass sample is being inserted into the arc-spark stand of the Quantometer for analysis. In a matter of only 1½ minutes, sample will be completely analyzed.

# Chase **BRASS & COPPER**

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

#### *The Nation's Headquarters for Brass & Copper*

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Boston	Detroit	Minneapolis	Providence	
Chicago	Houston	Newark	Rochester†	(†sales office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

June 24, 1954

## AIRCRAFT PARTS HARD TO HANDLE?

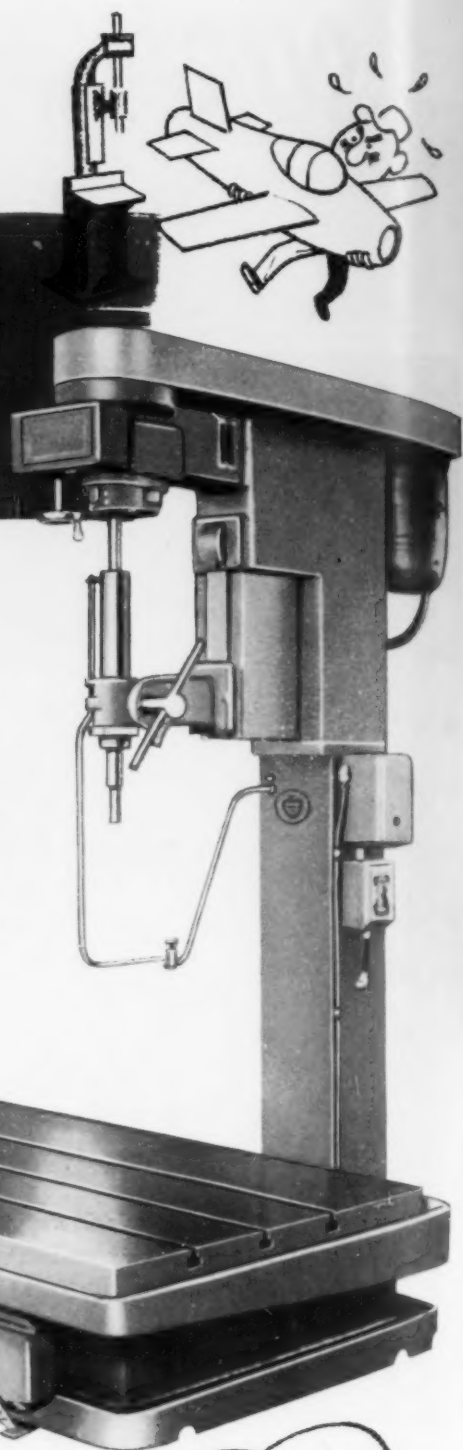
# NOT WITH THIS NEW LELAND-GIFFORD DRILLING MACHINE

Developed in 1951 for one of the world's largest and most respected builders of piston and jet aircraft engines, this Leland-Gifford Drilling Machine has served so well that dozens more have been installed and some of these augmented by additional columns. It has proved a particularly successful solution to the problem of drilling and tapping large, annular, stainless steel pieces such as compressor, diffuser and turbine exhaust bases... bulky parts which are normally hard to handle.

Some of the outstanding features of this machine are:

- 24 inch Overhang
- Large 42 x 78 inch Platen
- 8 Spindle Speeds from 90 to 3600 RPM
- Single or Multiple Spindles
- 12 inch Spindle Travel
- Provision for Additional Columns
- Power Feed or Reversing Motor Tapper

The flexibility of this design plus the inherent accuracy and operating ease found in all Leland-Gifford Drilling Machines make this unit a worthy addition to the drilling and tapping facilities of any plant. Why not ask your near-by Leland-Gifford sales engineer for complete information?



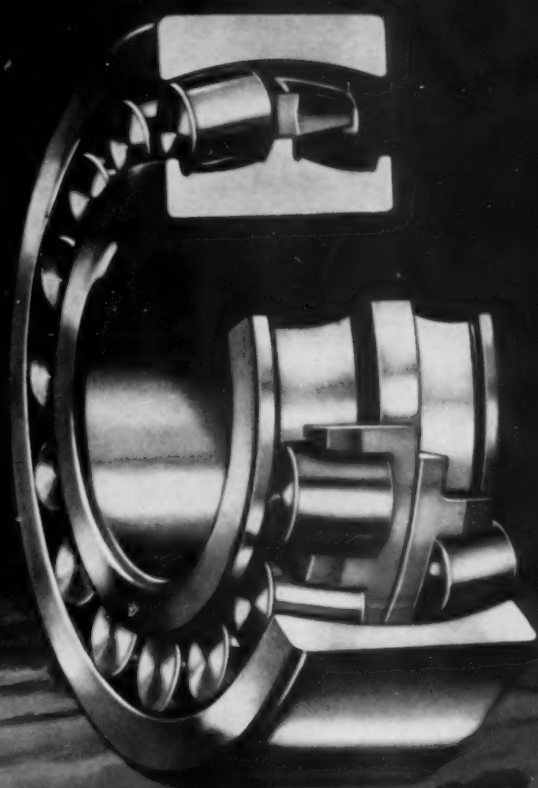
EXEMPLIFYING  
NEW ENGLAND  
CRAFTSMANSHIP

# LELAND-GIFFORD

## *Drilling Machines*

WORCESTER 1, MASSACHUSETTS, U.S.A.

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## Why it pays to specify **TORRINGTON Spherical Roller Bearings**



Uniform, close control of precision-ground contact surfaces—for even load distribution, maximum bearing life.



Accurate geometrical conformity between races and rollers—for ultimate capacity and performance.



Races and rollers heat treated according to the most advanced metallurgical procedures.



Machined, cast-bronze cages—one for each path of rollers—assure freedom of operation.



Integral center flange on inner race—to give positive radial and thrust stability—both essential to satisfactory performance.

Available from stock with either straight or tapered bore—for shaft or adapter mounting.

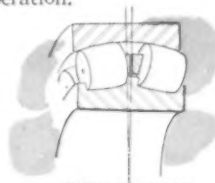
*These are advantages that give you long, efficient, low-maintenance service in the toughest heavy-duty applications... maximum value for your bearing dollar. That's why it pays to specify TORRINGTON Spherical Roller Bearings.*

### THE TORRINGTON COMPANY

South Bend 21, Ind.

Torrington, Conn.

**TORRINGTON** *SPHERICAL ROLLER* **BEARINGS**



Self-aligning—for continuous, free-rolling service under shock loads and at sustained speeds.

Unit assembly—for easy, low cost handling.

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers



# These 2 LEVERS

on the  
RPMster—



## —Add an Extra Profit Margin To Your Drilling

The exact required speed for the size of drill, the material hardness or the tapping or reaming operation you're about to start—instantly, without shutting off the motor! It's not only a big convenience to the operator of the "Buffalo" RPMster, but it saves valuable minutes in every operation. These heavy, ruggedly built "drills with 1001 speeds" are setting some excellent profit-drilling records in shops industry-wide. Back gearing and power feed, too, are standard equipment. Better write today for Bulletin 3257A for the facts on these machines that all but think for the operator!



### BUFFALO FORGE COMPANY

492 Broadway

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

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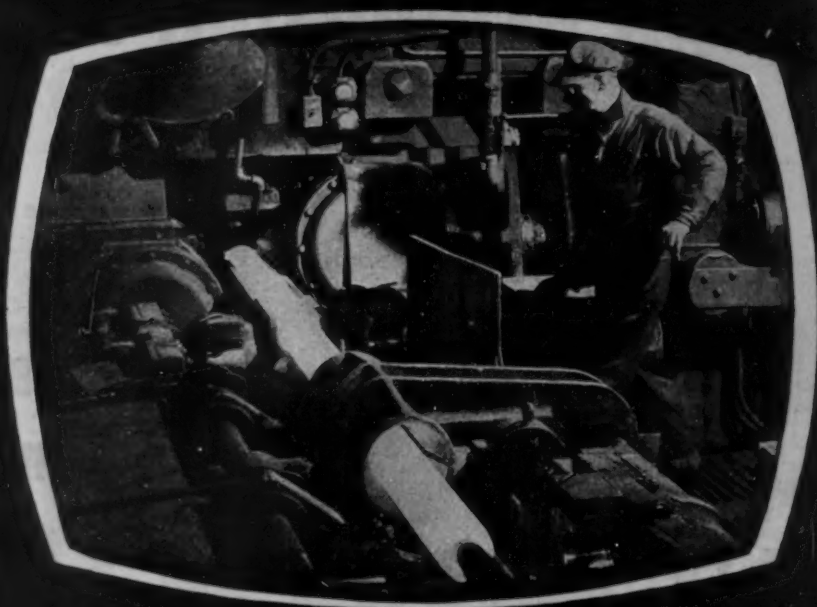
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**Here is a Lubricant that Can't  
Burn Off, Flake, or Gum Up**

'dag' dispersions of colloidal graphite form microscopically thin *dry lubricating* films which fight friction beyond the burning-points of most oils. They cannot burn off, flake, or gum up at ordinary metalworking temperatures. These dry films are unaffected by heat up to 750°F. . . . under some conditions up to 3,000°F.

'dag' dispersions can profitably be used in stamping, deep drawing, piercing, casting, forging, stretch-forming, and wire drawing operations. They lessen die wear, produce smooth parting and clean surfaces, minimize scaling and sticking, reduce tearing and rippling, and assure uniform dimensions.

For more details on metalworking applications, write for Bulletin No. 426-F5.

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.



**Acheson Colloids Company, Port Huron, Mich.**

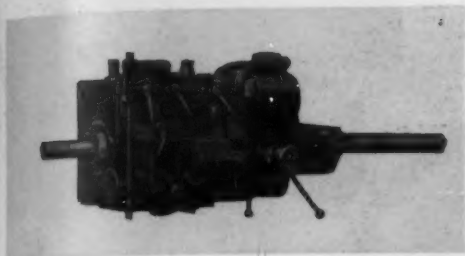
... also **ACHESON COLLOIDS LIMITED, LONDON, ENGLAND**



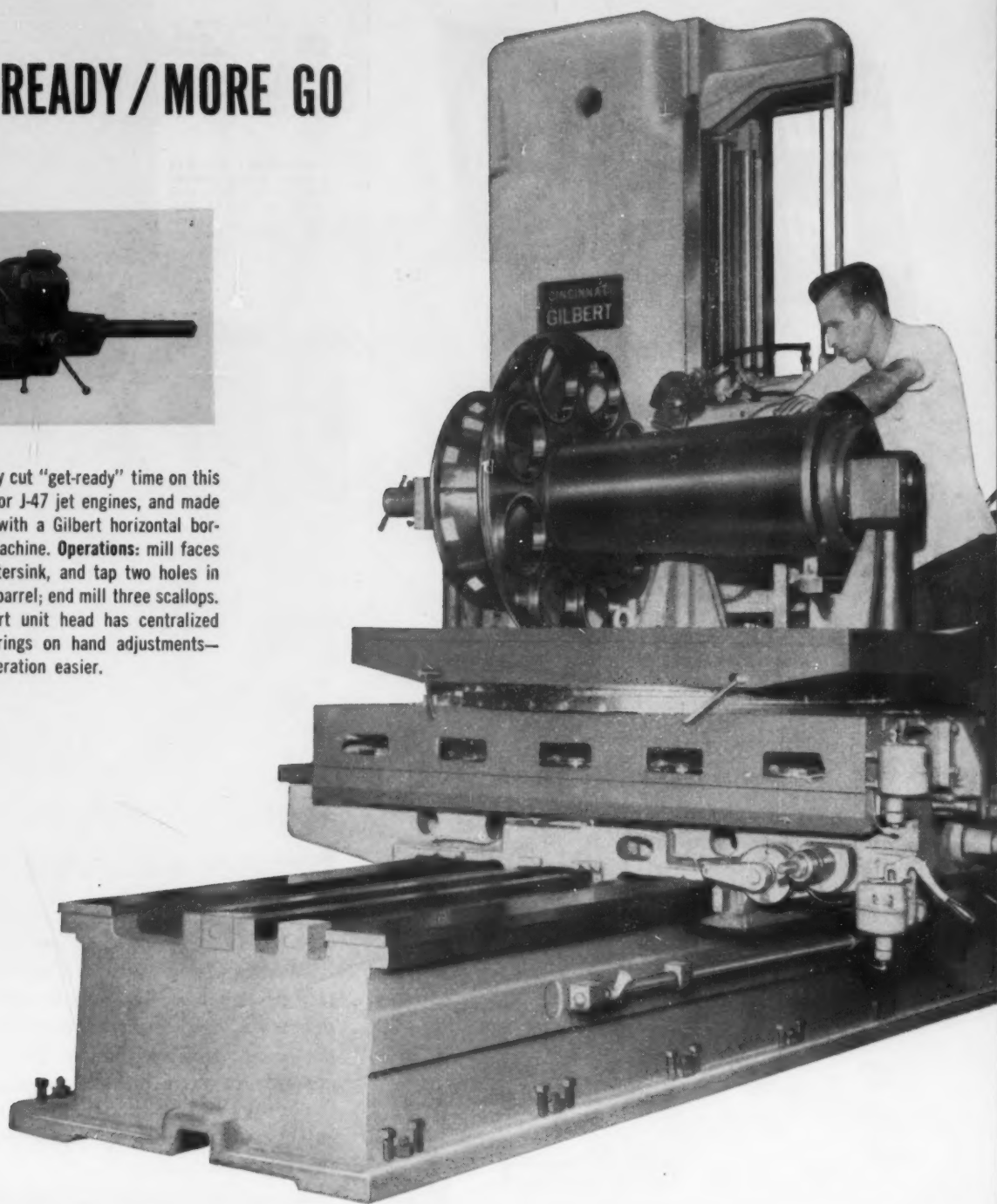
try 'dag' resin-bonded dry films for permanent lubrication



## LESS GET-READY / MORE GO



Ryan Aeronautical Company cut "get-ready" time on this stainless steel aft frame for J-47 jet engines, and made "go" time produce more with a Gilbert horizontal boring, drilling, and milling machine. **Operations:** mill faces of lifting pad; drill, countersink, and tap two holes in pad; drill hole in aft frame barrel; end mill three scallops. **Time:** 105 minutes. Gilbert unit head has centralized controls, anti-friction bearings on hand adjustments—makes indexing faster, operation easier.



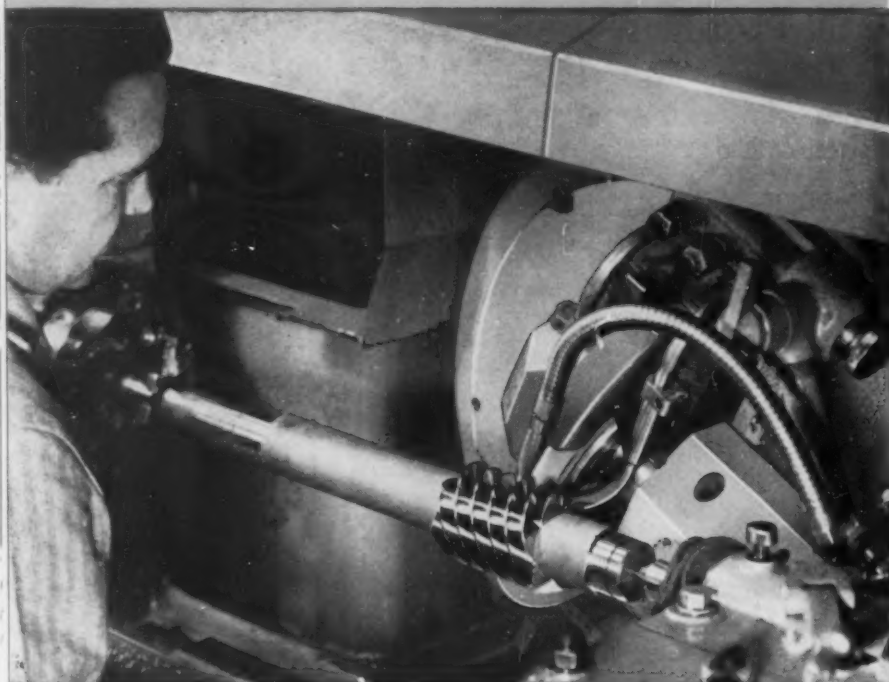
"Those who buy Gilbert buy Gilbert again" because of the efficiency of the single spindle and unit head design, ample capacity for most boring requirements, plenty of power for fast and heavy cuts with carbide tools, sustained accuracy in long, hard service. 3 1/2-inch spindle, table and floor type boring mills available in a wide variety of arrangements. Write for Bulletin 953.

# GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO

# Grinding 5-Start Worm with 4" Lead

## STANDARD STYLE 36 EX-CELL-O Precision THREAD GRINDER

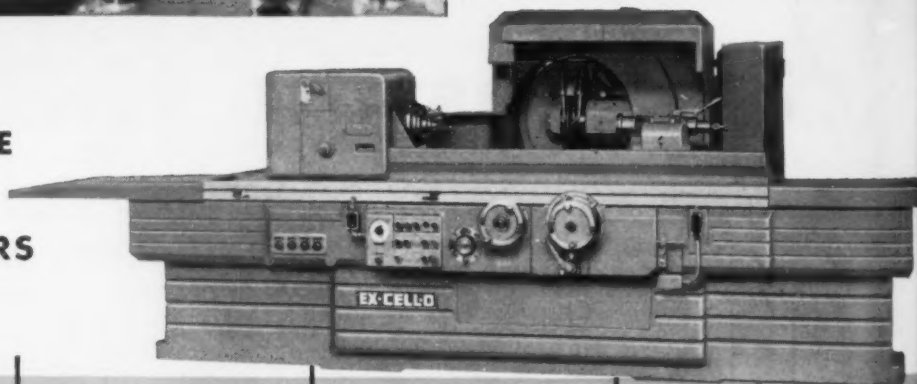


In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.



### A COMPLETE LINE OF PRECISION THREAD GRINDERS



**STYLE 50**  
Precision Thread Grinder—a versatile machine for external work, also available with internal attachment.

**STYLE 33**  
Precision Thread Grinder—a high production machine for external work.

**STYLE 39-A**  
Precision Thread Grinder—a high production machine for internal threads.

**STYLE 36**  
Precision Thread Grinder—versatile machine for external long external threads, available with internal attachment.

## EX-CELL-O CORPORATION • Detroit 32, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

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## Which package is best for you?

ROEBLING HIGH CARBON WIRE is packaged in many ways...and for every kind of usage there's one particular type of packaging that will bring top handling and production efficiency...new economy in your plant. For certain wires, Roebbling's new large-size reels or new disposable spoolless cores have special money-saving advantages:

The large reels are ideal for long runs. They reduce down time to a minimum.

The new spoolless core (a hollow fibre core without flanges) abolishes the storing and return of empty spools...eliminates charges for spools and waiting for credits.

You *pay* for the best when you buy high carbon wire. Make sure you *get* it in wire and packaging. Specify Roebbling. John A. Roebbling's Sons Corporation, Trenton 2, New Jersey.



**ROEBLING** 

Subsidiary of The Colorado Fuel and Iron Corporation

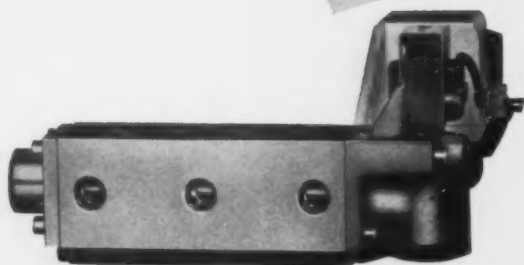
ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • ROCHESTER, 1 FLINT ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.

PHOTO BY MCMAN



# Quick-As-Wink AIR AND HYDRAULIC Control Valves

FEATURE  
THIS  
MONTH

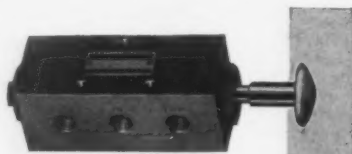


## Single Plunger Solenoid Pilot Operated Valves

They'll give you millions of cycles of efficient trouble-free operation

• Quick-As-Wink Solenoid Valves are unsurpassed for positive, trouble-free dependable service . . . they give users millions of cycles of fast, high speed — and safe — operation. All parts are rugged. Low amperage requirement of the solenoid eliminates intermediate relays and simplifies electrical circuits.  $\frac{3}{8}$ " to 2" sizes. 2-way, 3-way or 4-way actions. Bucking cylinder or double solenoid return. Send for the data sheets. Get full details about Quick-As-Wink, America's outstanding valve line, today.

also the following

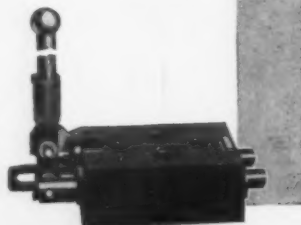


### PUSH BUTTON OPERATED AIR VALVES

Push-pull or push and spring return operation —  $\frac{1}{8}$ " and  $\frac{1}{4}$ " tapped connections. Widely used for controlling cylinders and many other applications. Air to 125 psi — vacuum — can also be used in low pressure hydraulic service.

### LEVER OPERATED HYDRAULIC VALVES

Two position or three position valves  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " sizes for line pressures 1000 to 5000 psi. Can be furnished in neutral, compound-exhaust or compound-on actions. Pilot cylinder operated types available up to 4".



For Fully Descriptive Data Sheets Write

**C. B. HUNT & SON, Inc.**

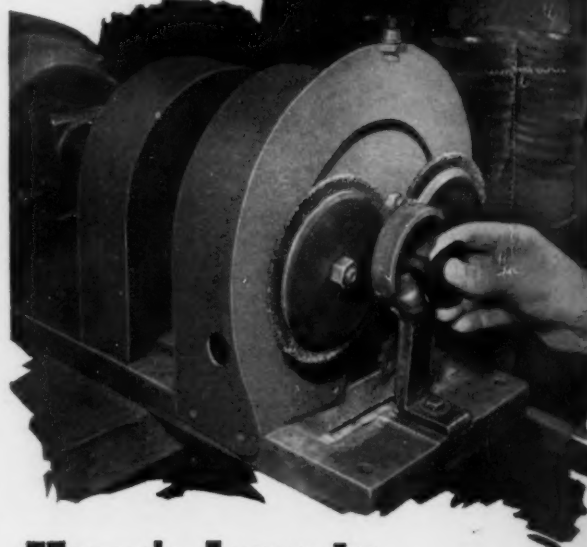
Hand, Foot, Lever, Cam, Pilot, Diaphragm and Solenoid Control Valves

2042 EAST PERSHING STREET

SALEM, OHIO

The rubber base of each valve is roughened by a Pittsburgh brush to secure a better bond when vulcanizing the valve to a tube.

Pittsburgh brushes remove excess rubber which spills onto valve cap thread during vulcanizing operation. (Guard housing has been removed for clarity.)



## Here's how to brush rubber

A. Schrader's Son, Brooklyn, New York, uses Pittsburgh brushes in the production of tire valves for leading tire manufacturers. In one operation, two brushes remove the excess rubber which flows around the valve threads during the vulcanizing process—750 valves per hour are cleaned in this manner!



Another Pittsburgh brush on a buffing machine roughens the rubber base of the valves to secure a better bond when vulcanizing the valve to a tube. In this operation, the Pittsburgh brush was chosen because it outlasts competitive makes.

WRITE TODAY for your free copy of our new booklet that shows thru actual case histories, how Pittsburgh can help cut your brushing costs. Address: Pittsburgh Plate Glass Company, Brush Div., Dept. W-10, 3221 Frederick Ave., Baltimore 29, Md.

**PITTSBURGH**

*Power Driven*

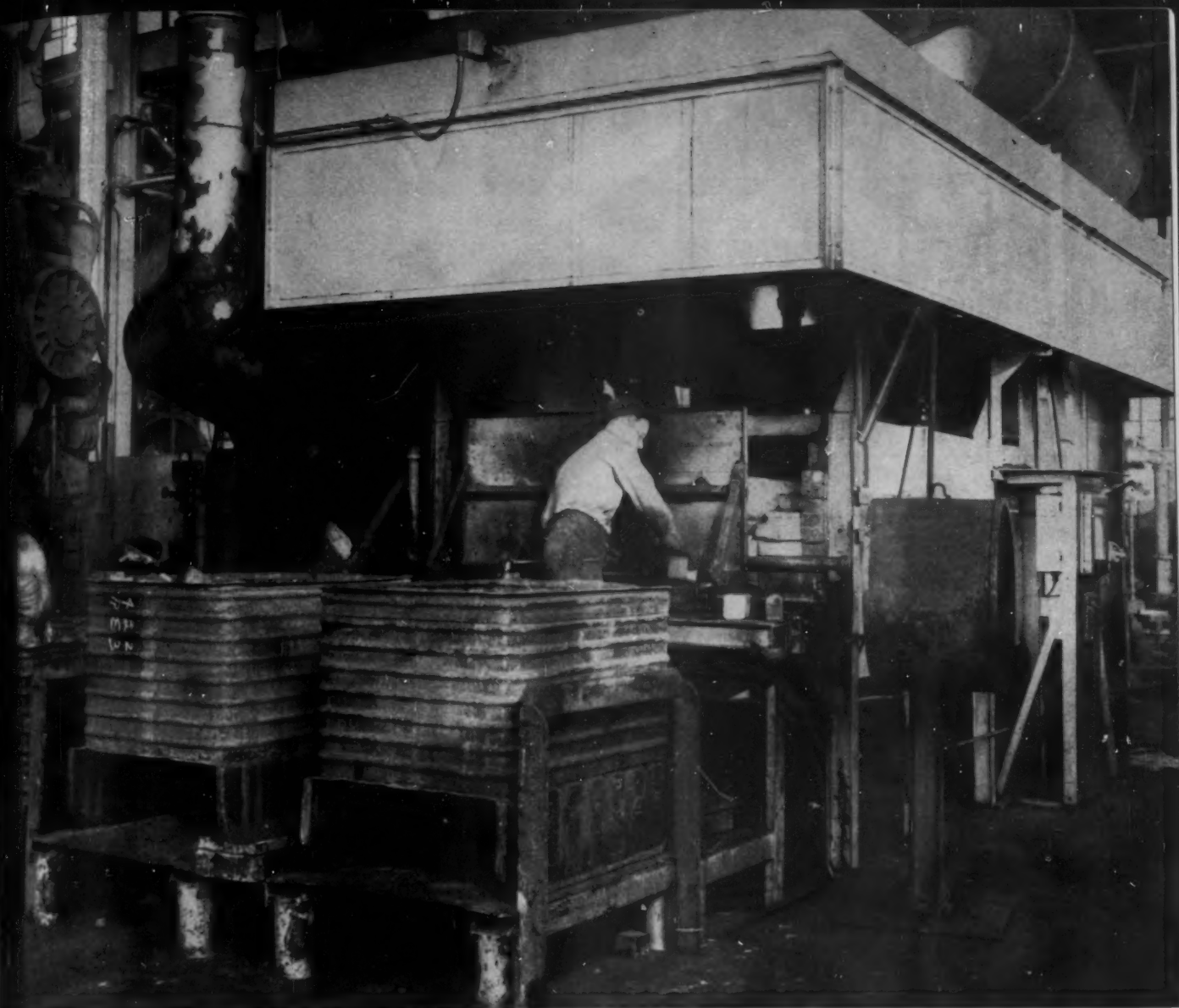
**BRUSHES**



BRUSHES • PAINTS • GLASS • CHEMICALS • PLASTICS • FIBER GLASS

**PITTSBURGH PLATE GLASS COMPANY**

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED



Silicon carbide skids replace chrome hearths in seven furnaces, and give . . .

## 3 Times the hearth life

This forge furnace is one of seven operated by a well-known automotive company. In four of these they heat 16-lb steel slugs to 2250 F, pushing through about 250 slugs every hour. In the others they heat 6-lb billets. All seven furnaces originally had rammed, chrome-ore hearths, but the wear and tear was much too severe. The hearths constantly needed repairs. And in less than three months, they'd be worn out.

Today, all these furnaces have silicon carbide skid rails. These average *nine months' life*, and require few repairs between times. That's only one third as many replacements as formerly required; one third the labor; and one third the downtime.

Figure the total savings! They're sizeable enough to make anyone check for possible applications for our refractories. The easiest way: leaf through "Super

Refractories in Heat Treatment Furnaces"—40 easy-to-read pages of picture-caption case histories. Your type of furnace is undoubtedly shown. Write for your copy today. No obligation, of course.



### CARBORUNDUM

Registered Trademark

Dept. B-64, Refractories Division  
The Carborundum Co., Perth Amboy, N. J.

Please send free booklet to:

NAME \_\_\_\_\_ POSITION \_\_\_\_\_

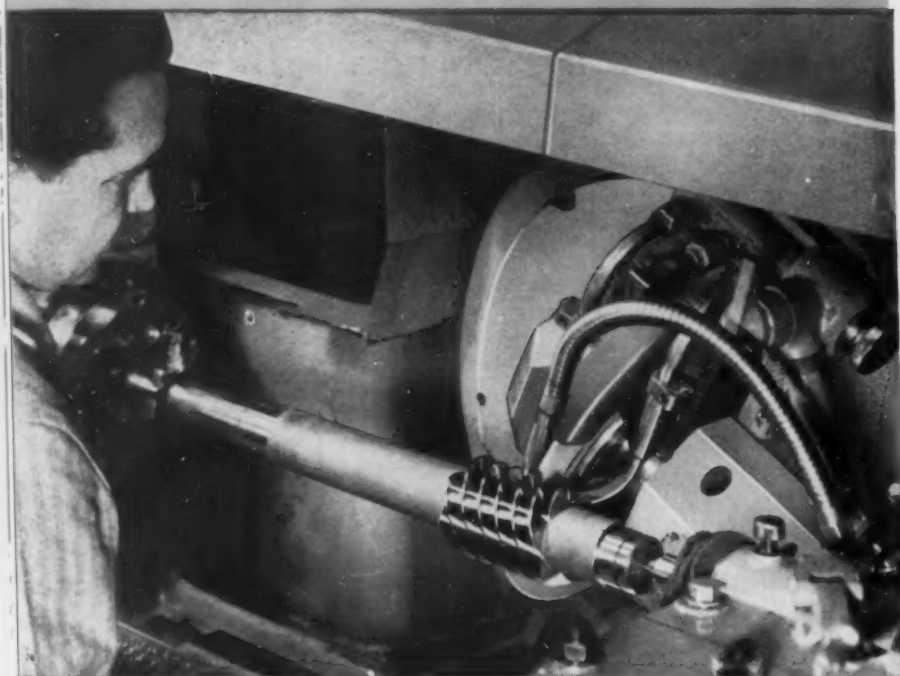
COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

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# Grinding 5-Start Worm with 4" Lead

## STANDARD STYLE 36 EX-CELL-O Precision THREAD GRINDER

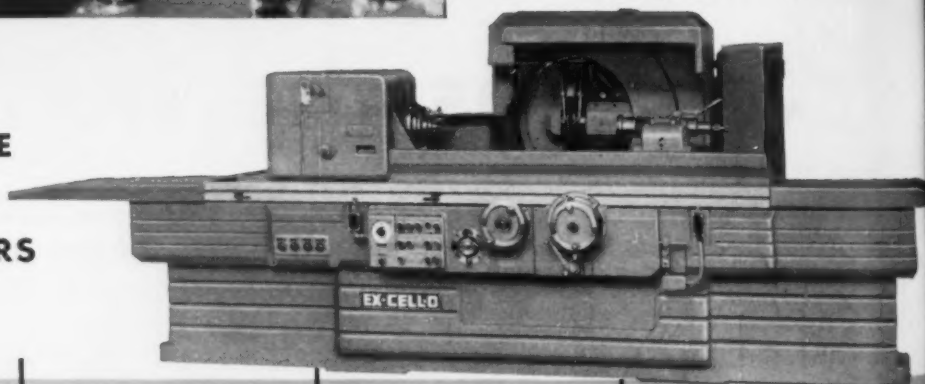


In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.



### A COMPLETE LINE OF PRECISION THREAD GRINDERS



**STYLE 50**  
Precision Thread Grinder—a versatile machine for external work, also available with internal attachment.

**STYLE 33**  
Precision Thread Grinder—a high production machine for external work.

**STYLE 39-A**  
Precision Thread Grinder—a high production machine for internal threads.

**STYLE 36**  
Precision Thread Grinder—a versatile machine for long external threads, available with internal attachment.

## EX-CELL-O CORPORATION • Detroit 32, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



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## Which package is best for you?

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PHOTO BY MC MATTHEW

**Wagner®**  
ELECTRIC MOTORS  
... the choice of leaders  
in industry

**SAVE**  
maintenance dollars with  
**Wagner Fan-Cooled  
Industrial  
Motors**



**HERE'S HOW-**

the Wagner Cartridge Bearing Design cuts your maintenance costs:

**Bearings are protected at all times.** The Wagner design completely encloses the bearings in a sealed cartridge. Labyrinth seals prevent the entrance of water, dirt and other foreign material. Even when the motor is disassembled, the cartridge remains intact as part of the rotor shaft. The bearing housing stays completely enclosed for full protection against dirt and dust.

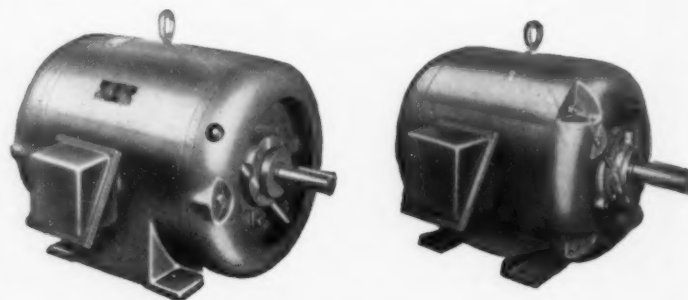
**Wagner Bearings can be relubricated.** When lubrication is necessary to forestall premature bearing

failure in unusually severe applications, readily accessible lubrication openings permit addition of grease or complete relubrication.

**Wagner Bearings run longer between grease periods.** Hot bearings shorten grease life. Wagner bearings have a low temperature rise because the design incorporates a deflector shield that directs a cooling stream of air around the bearing housing. Bearings run cooler and longer between maintenance periods.

This cartridge bearing design is a feature of the entire Wagner line of totally-enclosed fan-cooled motors. The line includes standard and explosion-proof steel frame motors, and standard and explosion-proof cast iron frame motors. All types are available with normal torque or high torque characteristics, in ratings to 250 hp.

For complete information—just call the nearest of our 32 branch offices, or write for Bulletins MU-132 and MU-196.



WAGNER ELECTRIC CORPORATION  
6403 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS  
TRANSFORMERS  
INDUSTRIAL BRAKES  
AUTOMOTIVE  
BRAKE SYSTEMS—  
AIR AND HYDRAULIC

THE IRON AGE

MORE HP PER

POUND • MORE HP PER CU. IN. • MORE HP PER DOLLAR



# 190,000 STANDARD *Stock* ANSWERS TO *Your* DRIVE PROBLEMS

Size for size, Cone-Drive speed reducers will out perform any other worm geared speed reducer on the market. Yet, you can select any one of 190,000 standard stock reducers to meet your specific drive problem.

Ratios from 5:1 to 4900:1.

Loads from fractional to 800 HP.

Only 58 standardized mountings.

You can see how almost 100 manufacturers are now using Cone-Drive gears. Ask for Bulletin CD-173.



## CONE-DRIVE GEARS

DOUBLE ENVELOPING GEAR SETS & SPEED REDUCERS

*Division, Michigan Tool Company*  
7171 E. McNichols Road • Detroit 12, Michigan

USE YOUR SOLVENT DRUM FOR A TANK!  
CUT COSTS IN SMALL PARTS CLEANING!

with the

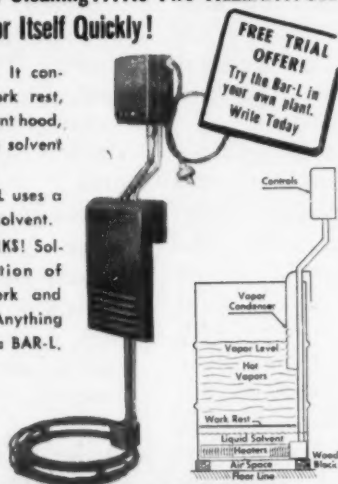
### MANPRO BAR-L DEGREASER

Small Investment...Efficient Cleaning...No Fire Hazard...Use Any Drum and It Will Pay for Itself Quickly!

Anyone can operate the BAR-L. It consists of a heating element, work rest, condenser with a corrosion-resistant hood, and controls. The drum in which solvent is shipped is used for the tank!

It's completely safe! The BAR-L uses a non-explosive, non-flammable solvent.

HOW THE BAR-L DEGREASER WORKS! Solvent is heated in lower section of drum. Vapors condense on work and wash parts in about 60 seconds. Anything that fits drum can be cleaned in a BAR-L.



FREE TRIAL OFFER!  
Try the Bar-L in your own plant.  
Write Today



**MANUFACTURERS PROCESSING CO.**  
**MANPRO METAL CLEANING EQUIPMENT AND CHEMICALS**

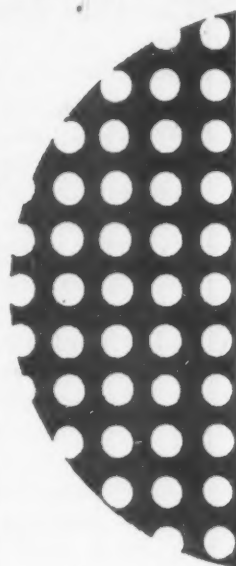
1358 Hilton Road — Detroit 20, Michigan  
Branches: Cleveland, Ohio, and Grand Rapids, Mich.  
Representatives in Principal Industrial Centers

count on

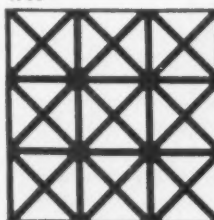
## WISSCO

for every type of perforation

- All metals including stainless and carbon steel, monel, copper, brass, bronze and aluminum.
- Thickness as required from .003" to .375" with holes from .020" in brass and .027" in steel.
- Wide variety of dies for every type of design.
- Fabricating facilities include rolling, forming, shearing, welding and assembling.
- Perforating also done on plastic and composition material for sound conditioning.
- Material to be perforated can be supplied either by us or by your company.



1986



WICKWIRE SPENCER STEEL DIVISION OF CF&I  
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

**WISSCO**  
**PERFORATED METALS**  
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION  
THE COLORADO FUEL AND IRON CORPORATION



good machinery

**REBUILT**

to exacting standards

No. 1H MILWAUKEE Plain Horizontal Mill, new 1941  
 No. 2H KEARNEY & TRECKER Horizontal Mill, new 1942  
 No. 2 VAN NORMAN Plain Horizontal Mill, new 1943  
 No. 2MI CINCINNATI Vertical Mill, new 1951  
 No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, 1943  
 No. 3-24 CINCINNATI High Power Plain Mill, rectangular overarm  
 16" x 78" centers REED PRENTICE, Model AA Toolroom, 1943  
 27" x 12" centers LODGE & SHIPLEY Selective Geared Head Lathe, AC-MD  
 36" x 12" centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD  
 No. 3A WARNER & SWASEY Turret Lathe, Timken Spindle, electric chuck, tooling  
 No. 3 WARNER & SWASEY Universal Turret Lathe, Serial 800,000, new 1944, two speed motor in base  
 No. 12 GISHOLT Simplimatic Turret Lathe, new 1947  
 36" BULLARD High Speed Spiral Drive Vertical Turret Lathe, 200 RPM, fine feed, new 1942  
 42" BULLARD Spiral Drive Vertical Turret Lathe, extra high column  
 42" KING Vertical Boring Mill, 10 HP AC motor, power rapid traverse  
 No. 7 GALLMEYER & LIVINGSTON Hydraulic Universal Tool & Cutter Grinder, power feeds, new 1943  
 30" MORTON Hydraulic Keyseater, 1942  
 No. 6A MITTS & MERRILL Keyseater, capacity 0 to 4" width, 36" stroke, tooling  
 4" FOSDICK Sensitive Radial Drill, new 1951  
 4" HAMMOND Jackknife Radial Drill tapping attachment, new 1948  
 5'-13" column CARLTON Radial Drill, AC motor & gearbox on base  
 6'-17" column CINCINNATI BICKFORD Super Service Radial Drill, power rapid traverse, motor on arm.  
 48" x 48" x 12" NILES Double Housing Planer, 2 rail heads, 1 side head, power rapid traverse  
 48" x 48" x 12" CINCINNATI Double Housing Planer, 2 rail heads, 1 side head, power rapid traverse

We Can Arrange Time Payments or Rentals with Option to Purchase

**O'Connell**  
 MACHINERY CO.  
 of BUFFALO, n. y.  
 1693 GENESEE ST.

## The Clearing House

NEWS OF USED AND REBUILT MACHINERY

### Midwest Opinions Differ . . .

Only one thing seemed certain last month—that opinion about the immediate future for used machine tools, as well as the proper inventory direction, is divided.

There had been some instances of inventory buildup by Midwest dealers in the last 60 days. With June sales holding at last month's levels, the inventory builders seemed to have called their shots correctly. They now have a more varied line of equipment but haven't been caught by a sales drop-off.

On the other hand, a few dealers are beginning to speak of a desire to reduce their present stocks. No crying hurry about it, no urgent need to get rid of material, but they'd like to see a few less tools on the shop floor. This isn't general, and is attributed in part to the approaching vacation season. But it's there.

### See Better Second Quarter . . .

The "scale down" attitude isn't borne out by most sales reports. June seems as good as May in most cases and better in some. And, although statistics aren't yet available, everybody is sure that second quarter sales will beat first quarter by a substantial margin. This would reflect the old seasonal pattern, with December-January one of the slack periods, and July-August the other.

Auctions, as previously reported to THE IRON AGE in other districts, are also a problem in the Chicago area. Consumers who usually bought through used tool dealers continue to haunt plant auctions. Said one dealer, "I'll give that customer a better price, a better guarantee, and what I believe is a better reconditioned machine. (And that's if he can get any kind of guarantee at an auction)."

### Less Inquiry. More Sales . . .

Inquiries are down, but percentage of sales to inquiries continues

to rise. Turret lathes continue slow and at present prices are pointed out as a good buy. Grinders, mills, small lathes, punch presses, and toolroom equipment generally, continue to be good inventory items and carry more than their share of the sales burden.

Production equipment is the laggard in nearly all cases, despite a considerable number of new plant starts or plant renovations in the Chicago-Milwaukee area since January.

**NISA Convenes . . .** National Industrial Service Assn., the national trade association of industrial electrical repair shops, held its 21st annual convention in Detroit last week. One of the most interesting of the many talks on the electric motor repair industry heard at the conclave was a paper by M. G. Miller dealing with the progress of small motor repair shops.

Mr. Miller pointed out that in 1936 there were no independent small motor repair shops in the U. S. Today, he said, NISA's membership of 1313 includes 1171 who indicate that small motor repair constitutes all or at least a major part of their business.

NISA elected G. E. Jones of Amarillo, Tex., president for the forthcoming year with Joseph H. Previty, Philadelphia, vice-president, Charles J. Covington, Mt. Vernon, Ill., secretary, and C. R. Durand, Allentown, Pa., as treasurer.

**Seeks Rebuilding Aid . . .** The Army Ordnance has asked Machinery Dealers National Assn. to aid in a program of rebuilding machine tools. MDNA headquarters has polled all member firms to find:

1. Those interested in participating in the Ordnance program
2. What the tool rebuilding capacity of these interested firms might be. Meetings with Ordnance will be held in Chicago in the near future to explain the work in detail and let contracts.

# THE CLEARING HOUSE

## CONSIDER GOOD USED EQUIPMENT FIRST

### BALER—SCRAP METAL

Logemann 7-PH Baler, Chamber 60" long by 18" deep x 16 1/2" wide. Finished Bundle 60-90 lb.

### BAR TURNING MACHINE

26 Size RGF Medart Centerless Automatic Bar Turning Machine. Capacity 1" to 6" incl.

### BENDING ROLLS

8" x 1/2" Bertsch Initial Type Bending Roll—LATE

12" x 1/2" Hillis & Jones Pyramid Type Bending Roll

18" x 1/2" Hillis & Jones Pyramid Type Bending Roll

24" x 1/2" Hillis & Jones Pyramid Type Bending Roll

### BRACKS—LEAF TYPE

8" x 1/2" Dreis & Krump Size 186

18" x 1/2" K.C. Leaf Type Brake, Hydraulic

### BRACKS—PRESS TYPE

8" x 3/16" Crill Bath Model 100-8

18" x 3/16" Dual Model 60-12 All Steel Press Brake

18" x 3/16" Dreis & Krump Model 4510D Press Brake

18" x 3/16" Lee & Nawrath Press Brake

15" x 3/16" Jordon Hydraulic Press Brake

### CRANES—OVERHEAD ELECTRIC TRAVELING

7 1/2 ton Floor Operated 22' Span 220/3/60 A.C.

15 ton F & H 97' Span 115 Volts D.C.

With 220/440/3/60 Motor Generator

50 ton Toledo 75' Span 550/3/60 A.C.

25 ton F & H 37' Span 440/3/60 A.C.

30 ton Case 48'7" Span 230 Volt D.C.

With 5 ton Auxiliary 60' Span 220/3/60

125 ton Cleveland 61'6" Span 220 Volt D.C.

With 2 Trolleys 62 1/2" T & 10 Aux.

### DRAW BENCH

35,000 McKay Chain Draw Bench, 41' Length of Draw

100,000# Poole Draw Bench. Max. length bar 39'

With draw up to 4 1/4" max. round

### FORGING MACHINES

1 1/2" 2" 3" 4" 5" 7" Ajax

1" 4" 3" 5" Aeme

1" National

### FURNACES—MELTING

2 ton Pittsburgh Lectromelt Size "CQT"

6 ton Swindell Arc Melting Furnace

6 ton Heroult Arc Melting Furnace

6 ton Electric Furnace Co Arc Melting Furnace

10 ton Electric Furnace Co Arc Melting Furnace

### HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING—800 lb. to 8,000 lb.

34" Aema Standard Leveler, 17 Rolls 4 1/4" Dia.

72" Sutton Roller Leveler, 23 Rolls 2 1/2", Backed-up

### POLISHING MACHINE

Model 464 Mattison Polisher, Capacity 24" Wide Strip, Motor Driven with 40 H.P. A.C. Motor

### No. 0 MEDART Continuous Automatic Bar Straightening Machine, M.D. Capacity 1/4" to 1 1/2" diameter incl. or 2" Tubing. Any Length

No. 350 Model BL Milwaukee Hydraulic Briquetting Press, Capacity Grey Iron Briquettes 3 1/2 TPH

PRESS—EMBOSSING & COINING

Type K-1200-30 Clearing Knuckle Joint Press

PRESSES—HYDRAULIC

500 ton Wood 4-Column, 24" Stroke, 72" x 96" Bet. Columns

700 ton Clearing Hydraulic Press, Enclosed Type Pressing Surface Press Bed 144" x 60", Stroke 48"

1200 ton Baldwin Southwark 4-Column Hydr. Press, 36" Stroke, 87" x 51" Between Columns

1500 ton Southwark, 4-Column, Press, 36" Stroke Distance Between Columns 30 1/4" x 41 1/4"

PRESS—INCLINABLE

#648 Rockford, 71 Ton, 5" Stroke, Bed 21" x 31"

#88 Rockford, 100 Ton, 6" Stroke, Bolster 28" x 29"

PRESSES—STRAIGHT SIDE

No. B6 1/2 x 72 Niagara Gap Type Press, 6" Stroke Bed Area 72" R to L x 33 1/2" F to B

No. 48 Bliss S8 Eccentric Forging Press, 10" Stroke Distance between uprights 27-34"

PRESS—TOGGLE DRAWING

No. 37 D Bliss, 22" Stroke of Plunger, 15" Stroke of Blankholder, 29" Bet. Uprights

No. 58 Bliss Stroke 21", Blankholder Stroke 13", 34" Between Uprights

PUNCH & SHEAR COMBINATIONS

1 1/2" Buffalo Universal Ironworker—LATE

2 1/2" Buffalo Universal Ironworker—LATE

ROLLS—PLATE STRAIGHTENING

76" National, 17 Rolls 7" Dia., Motor Dr.

ROLLING MILLS

7 1/2" Steckel Four High Rolling Mill

8" x 12" Blake & Johnson Single Stand Two High

12" x 16" Waterbury Farrel Temper Mill

12" x 16" Waterbury Farrel 2-High Cold Mill

16" x 20" Lewis 2-Stand 2-High Cold Rolling Mill

18" x 24" Waterbury Farrel Two Stand Two High

22" x 40" Single Two High

14" x 40" Three High Roughing Mill

### SHEARS—GATE

8" x 1/2" Cincinnati Gate Shear

12" x 1" Pacific Hydraulic Gate Shear

### SHEARS—ANGLE

6" x 6" x 1/2" Hillis & Jones No. 2 Double Angle Shear

8" x 8" x 1 1/2" Kling Double Angle Shear

### SHEARS—ROTARY

3/16" Quickwork Rotary Shear, 36" Throat

1/2" Quickwork Circle Shear, 18" Throat, With Circle Cutting Attachment 60" Throat

### SHEARS—SQUARING

6" x 1/2" Cincinnati, 18" Gap, Motor Driven

10" x 3/16" Bertsch, 24" Gap, Motor Drive

10" x 3/16" Dreis & Krump, Motor Drive

10" x 1/2" Columbia, Motor Drive

12" x 1/2" United, 15" Gap, Motor Driven

### SLAB MILLER

Torrington Slab Miller, Rotary Type, Motor Dr. Max. Capacity 16 1/2" Width, 1" Thick

### SLITTERS

12" Yoder Slitting Line

20" IM&M Co. Slitting Line

24" Torrington Heavy Duty Slitter

120" Stanco Sheet Slitter

### SWAGING MACHINES

No. 7 Langellier Swager, Capacity Tubing 3 1/2", Solid Cold 2 1/2", Solid Hot 3"

No. 8A Penn Rotary Swager, Capacity 2 1/2" Solid 6" Steel Tubing, Motor Driven

### STRAIGHTENERS

No. 4 Abramson Flat & Shape Straightener, Capacity 3 1/2" x 1/2" Flats, 2" Square & Hex., etc.

No. 1 Sutton 2-Way Flat & Shape Straightener, Capacity—Max. 4" x 1/2" Flat, 2 1/2" Sq. & Hex., 4" x 4" x 1/2" Angles, 4" Channels

### TESTING MACHINES

60,000 lb. Southwark-Tate-Emery Universal Hydr.

50,000 lb. Riehle Universal, Belt Driven

100,000 lb. Tinius Olsen Universal 4-Screw

150,000 lb. Tinius Olsen Universal 3-Screw

### TRIMMER

No. 43 H. V. Whiting Corp. Quickwork Trimmer Capacity 3/16" Mild Steel, Motor Driven

### WELDING POSITIONER

40,000 lb. Worthington-Kensome Model 400 Welding Positioner, Table Top 84" Square, NEW 1950

### WIRE MACHINERY

6-Bobbin Planetary Type Wire Rope Closer, Cap. 100#

12-Wire Tubular Type Wire Stranding Machine, Cap. 11#

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Confidential Certified Appraisals

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Consulting Engineering Service

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## Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

### MANUFACTURING LATHES

12 x 18" Reid Small Piece Production Lathe, Model 4 WSL, m.d.

No. 3 Lodge & Shipley Duomatic, m.d., late type

No. 3A Lodge & Shipley Duomatic, m.d., late type

Model B1—1/4" H.P. Blount Speed Lathe, m.d.

W. C. Lipe Carbomatic, m.d.

Colborne Mfg. Bench Type Speed Lathe, m.d.

No. 4 LeBlond Boring Lathe, 37" bed, 4" hole, m.d., latest

No. 9, 12 LeBlond Multi-Cut, m.d.

4 x 60" LoSwing, m.d.

8 x 100" LoSwing, m.d., taper, latest

8 x 132" LoSwing, m.d., latest

9 x 12" Sundstrand, s.p.d.

11 x 18" LeBlond Rapid Production, m.d.

12 x 18" centers Monarch Model 5T, m.d.

Schauer Type NA 2B Speed Lathe, m.d., latest

30" x 10" LeBlond Turning Laths, cone

No. 12 Gisholt Semi-Special Automatic Production, m.d.

### HAND MILLING MACHINES

Van Norman, m.d., latest

### PLAIN MILLING MACHINES

No. 1B Milwaukee, m.d.

No. 1 1/2 Brown & Sharpe Plain, cone, motorized

No. 2 Rockford, m.d.

No. 2H Milwaukee Plain, m.d.

No. 3 Heavy Kearney & Trecker Milwaukee Plain, m.d.

No. 4 Ohio, cone

No. 5 Cincinnati, m.d., late type

No. 3B Brown & Sharpe, m.d.

### MANUFACTURING TYPE MILLING MACHINES

No. 00 Sundstrand Hydraulic Rigidmill, m.d.

3A Sundstrand Copy Rigidmill, m.d.

No. MM-1-4 U. S. Multi-Miller, m.d.

4" Pratt & Whitney Spline, m.d.

18", 24" Cincinnati Plain Automatic, m.d.

24" Cincinnati Duplex Automatic, m.d.

24" Garvin Cam or Form Milling Machine, m.d.

No. 21 Brown & Sharpe Automatic, m.d.

30" x 24" x 12" Ingersoll Planer Type Milling Machine, m.d.

48" x 16" Newton Slab Miller, m.d.

54" x 30" x 16" Ingersoll Slab Miller, m.d.

### INTERNAL GRINDERS

Model 5Y Bryant, m.d.

No. 16—16" Bryant, m.d., Hydraulic Hole Grinder

No. 16CRI6 Bryant, m.d., latest

No. 16—22" Bryant, m.d., latest

No. 16—38" Bryant, m.d., latest

No. 24P—26" Bryant, m.d.

No. 24—21" Bryant, m.d.

No. 44 Heald Facing Type Borematic, m.d.

No. 70A Heald, m.d., latest

No. 72 Heald Sizematic, m.d.

No. 72A Heald Sizematic "Duplex", m.d.

No. 72A Heald Gagematic, m.d.

No. 72A3 Heald Internal, m.d.

No. 72A3 Heald Sizematic, m.d.

No. 72A3 Heald Gagematic, m.d.

No. 72A5 Heald Sizematic, m.d.

No. 72A5 Heald Plain, m.d.

No. 73 Heald Airplane, m.d., latest new

No. 74 Heald, m.d.

No. 81 Heald Gagematic, Sizematic, m.d.

No. 649—16" Van Norman Automatic Oscillating Radius, m.d., latest

No. 5 Bryant, m.d., latest

### THREAD MILLING MACHINES

14" x 16" U6 Automatic Hob, m.d.

Hall Planetary, m.d.

6 x 14", 6 x 20" Pratt & Whitney

10 x 24" Hanson Whitney, m.d., latest

### VERTICAL MILLING MACHINES

No. 10—Sundstrand, m.d.

No. 1—14 Kent-Owens, m.d.

No. 08 Cincinnati, m.d., latest

Newton Vertical Miller, rotary table

54" Ingersoll Single Spindle Adjustable Rotary Mill, m.d.

No. 4 Cincinnati Vertical High Power, m.d., Timken



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1—34" & 22" x 100" 3-HIGH PLATE MILL with 3000 HP motor drive, vertical edger, two tilting tables.  
 1—24" BAR MILL, 3-HIGH, 3 stands, including motor, speed reducer, travelling tilting tables and billet furnace.  
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 1—4-HIGH COLD SHEET MILL, 3 stands.  
 1—4-HIGH COLD MILL, 20" roll face.  
 1—20" x 30" COLD MILL, 2-High, complete with drive.  
 1—10" x 12" 2-HIGH COLD STRIP MILL, with 75 HP motor and coiler.  
 1—TORRINGTON WIRE FLATTENING MILL, 2 stands.  
 1—44" ROLL LATHE, enclosed headstock, tailstock, piano rest, with 20 HP, 500/1500 RPM, 230 volt D.C. motor and control.  
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 1—PLATE SHEAR, capacity 156" x 9/16".  
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 1—STRAIGHTENER, Sutton #1, 5-roll, capacity 1 1/2" rounds.  
 1—BALER for scrap, bale size 18" x 10" x 10".  
 1—BILLETEER for conditioning billets up to 12" x 12".  
 1—7000 HP GEAR DRIVE, 365 to 83 RPM.  
 1—1500 HP GEAR DRIVE, 7.55 to 1.  
 1—1000 HP GEAR DRIVE, 244 to 30 RPM.  
 1—2000 HP MOTOR, 6600/3/60, 600 RPM.  
 1—1150 HP MOTOR, 2300/3/60, 900 RPM.  
 1—BILLET SHEAR, open side, cap. 3 1/2" round.

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Warco Press Brake, 10' 10 ga., new 1950.  
 Cleveland Plate Shear, capacity 5/8" x 60".  
 Long & Allstatter Plate Shear, cap. 7/8" x 60".  
 FV-75 Pels Billet Shear, Armour Plate, cap. 7 7/8" round, 7 1/8" square.  
 Guillotine Shears, 2", 3", 3 1/4".  
 1 1/2", 2", 3", 4" Ajax Upsetters, suspended slides.  
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 Ajax & Acme Upsetting and Forging Machines. Not Suspended Slides, from 1" up.  
 No. 3 and No. 4 Ajax Forging Roll. Also Ajax Brake Shoe Roll.  
 W. W. Bulldozers, #22, #3, #4, #25, #6, #27, #29 "U" type.  
 6000 Lb. Chambersburg Double Frame Steam Forging Hammer.  
 4000 Lb. Niles Bement Double Frame Steam Forging Hammer.  
 Chambersburg Board Drop Hammers, 800 Lb., 2000 Lb., 3000 Lb.  
 Nazel Air Forging Hammers, #4-B, #5-N.  
 Bradley Hammers, Cushion Helve, Upright and Compact.  
 Multiple Punch Size G, L & A., 940 tons.  
 Single and Double End Punches, various capacities, including ironworkers.  
 300 ton Oilgear High Speed Hydraulic Press, 2-Column, Stroke 18", ram 27" x 23".  
 600 ton Verson Knuckle Joint Coining Press.  
 600 ton Wood Hydraulic Locomotive Wheel Press. Also 400 ton wheel press.  
 Tensile Testing Machines—50,000, 200,000.  
 Threading Machines Lead Screw, 1" 2-spindle, 2-spindle 2", 4-spindle Landmaco 1 1/2".  
 2" Pipe Threaders, Landis, Oster, Chicago.  
 Willie Williams. All Lanco Heads.

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Landmaco Landis Threading Machine, 1", 2-spindle, Lead Screw, New 1952.

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## EXCELLENT MACHINE TOOLS

AUTOMATIC, 1 1/2"—8 spl. automatic, timken  
 AUTOMATIC, 20" x 25" Fay automatic lathe, 1942  
 BOLT SHAVER, Type KK Economy automatic shaver  
 and pointer  
 BORING MACHINE, 72" Niles Bement Pond Vertical heavy duty  
 BROACH, Model 542 Cincinnati duplex vert. surf. "Hydrobroach," new 1948.  
 DRILL PRESS, No. B-250-H Nates vertical hydraulic  
 DRILL PRESS, No. 36 HO Baker vertical hydraulic, late, heavy duty  
 FORGING MACHINE, No. 5N and No. 6B Nazel pneumatic hammer  
 GEAR MACHINERY, No. 86 Cross Gear Chamferer  
 GEAR MACHINERY, No. 343 Sheffield gear tooth rounder  
 GEAR SHAPERS, Nos. 71A, 712, 75A, and 715 Fellows  
 GRINDER, 16" x 96" Landis type B, 40" Gap, hyd. pl. cyl.  
 GRINDER, 16" x 72" Norton type C, hyd. pl. cyl. 1945  
 GRINDER, 72" Hanchett rotary surface, new 1945  
 GRINDER, 10" x 36" Landis type DC, cyl. hydraulic, late  
 GRINDER, 14" x 36" Landis, type C, cyl., hydr., late  
 GRINDER, 16" x 36" Norton type C, cyl., hydr., late  
 HONE, 204B Barnes, hydraulic, 1946  
 LATHE, No. 3A Warner & Swasey long bed universal turret, late  
 LATHE, 5 1/4" x 18" Libby universal hardened ways, turret  
 LATHE, 48"/52" x 20 1/2" NBP GH, like new  
 MILL, No. 3K Kearney & Trecker Univ., late type  
 MILL, No. 4K Kearney & Trecker plain, heavy duty, large table  
 MILL, 24" x 24" x 12" Ingersoll adj. rail plainer type, new 1945  
 MILL, 4/36 Cincinnati hydromatic production  
 MILL, 4/48 Cincinnati hydromatic production, duplex  
 PRESS, No. DA 841 Hamilton double action toggle drawing  
 PRESSES, 15, 25 & 50 Ton Dennison, hydraulic, late models  
 PRESS, 106 Ton No. 93D Toledo, DC, SS.  
 PRESS, 509 Ton, No. 1042 Verson, S.S., air clutch, all steel, late model  
 ROLL, LW-3 Yoder roll former, like new, ser. 3722  
 ROLL, 12" x 1" Millies & Jones pyramid type plate bending roll, D/E Housing  
 SHAPER, 16" American heavy duty  
 SHAPER, 24" Cincinnati CHmax heavy duty  
 SHAPER, 32" G & E Invinible, late type  
 TAPPER, No. 2 Bakewell vert. precision, late  
 TAPPER, No. 10, Warner & Swasey, new 1948  
 TAPPER, 3 1/4" Ajax, air clutch.  
 TAPPER, 5" Ajax, air clutch.

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BLISS No. 55 Double Action Toggle Draw Press  
 Bed Area 38"x33", Stroke of Blankholders 10"  
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 Capacity 255 tons, Bed Area 30" x 29", 18"  
 Stroke of Slide, Marquette Air Cushion.  
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 CLEVELAND Double Cranks, 65-G-72, 45-D-60.  
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 BLISS Nos. 4, 22K, and 24K Knuckle Joint Presses.

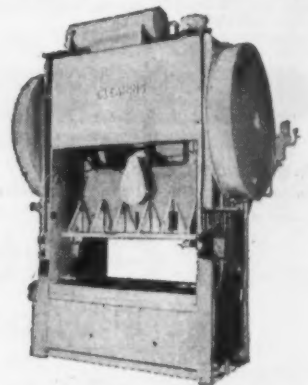
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 92 rolls, 1 3/16" dia. by 24" face.  
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 Motor 3 HP, 220/440 volts, 3 ph., 60 cy.

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 10" x 3/16" D. & K. No. 4510D Press Brake  
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## RE-NU-BILT GUARANTEED ELECTRIC POWER EQUIPMENT

D. C. MOTORS					
Qu.	H.P.	Make	Type	Volts	RPM
1	2200	G.E.	MCF	600	400/500
1	2000	Whse.	Mill	600	230/460
1	1200	G.E.	MCF	600	750/950
1	940	Whse.	QM	250	140/170
1	900	Whse.		250	85/180
1	825	Whse.		250	400/800
1	600	Al. Ch.		600	300/900
1	500	Whse.	CC-216	600	300/900
1	500	G.E.	MCF	600	300/900
1	450	Whse.		550	415
1	400	G.E.	MCF	550	300/1050
1	300/300	G.E.	MPC	230	360/920
1	250	G.E.	MPC	230	400/600
1	200	Rel.	1970T	230	720
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	890
1	150	Cr. Wh.	83H-TEFC	230	900/1800
1	140	Whse.	SK-151B	230	360/950
1	140	Whse.	SK-201	230	250/1000
1	50/120	G.E.	MCF	230	450/1000
1	100	Whse.	SK-181	330	1750
1	100	G.E.	CDP-115	330	1750

### M-G Sets—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
1	2000/2400	G.E.	450	250/300	2300/4600
1	1750/2100	G.E.	514	250/300	2300/4600
1	2000	G.E.	500	250	11000
1	2000	G.E.	514	600	6600/13200
1	1500	G.E.	720	600	6600/13200
1	1500	C.W.	514	30/115	4000/13000
1	1000	Whse.	900	600	4180
1	1000	G.E.	900	260	6600
1	1000 (3U)	G.E.	900	250	2200
1	750	Whse.	900	275	4160
1	750	C.W.	514	30/115	2300
1	600	G.E.	720	250	410/2300

### TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Volts
1	5000	Whse.	OIRC	3	3300x26400
1	2500	Whse.	OIRC	3	26400/13200x1460
1	2000	G.E.	HVDDJ	1	66000x13800
1	1500	G.E.	HT	3	13200x2300
1	1000	G.E.	HVDDJ	1	2400x480
1	1000	Wagner	OISC	1	13200x1460

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NO. 52 CHAMBERSBURG

Cap. 3,000#—A. C. Motor

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NO. 68 NAZEL

Cap. 6" Sq.—A. C. Motor

Excellent Condition—In Stock

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## ROLLER LEVELLERS

1—76", 17 Roll, 7" Dia.

50 H. P. Motor—National

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6585 CFM, 42/25 1/2 x 30, 930 HP, 138 1/2 RPM

5820 CFM, 40/24 x 27, 804 HP, 150 RPM

Five Step Clearance, Late Type Valves

Very good condition, Reasonable price

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## REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

### DIRECT CURRENT MOTORS 230-V.D.C.

Qu.	HP	Make	Type	RPM
6*	3000	Whse.	Mill	600
14*	1500	Whse.	Mill	600
10*	800	Whse.	Mill	600
8	700	Whse.	Mill	285/700
1	350	G.E.	CD-169	1150
1	250	G.E.	MPC	325/875
1	200/250	G.E.		300/900
1	200/250	El. Dy.	Size 22	400/1200
1	200	Whse.	Mill	300/1200
1	180	G.E.	MPC	400
1	160/90	G.E.	MPC	625/1125
1*	125	Whse.	SK-150	600
6	100	Whse.	SK-184	575/850
1	100	El. Dy.	30-S	450/1100
1	T.E.F.C 75	C.W. 534		860
1	50	Whse.	SK	250/1000
1	40	Whse.	SK-140	500/1700
1	35	G.E.	CD-135	400/1200
1	35	G.E.	CD-147	300/1200

\*—525 and 600 V. D.C.

### MOTOR GENERATOR SETS

Qu.	K.W.	Make	RPM	Volts DC	Volts AC
1 (3U)	2400	Whse.	720	600	4800/2400
1	1750	G.E.	450	250	4800/2300
1	1200	Whse.	720	600	2800
1	500	C.W.	720	575	2300/440
1	400	C.W.	1200	125/250	2300/440
1	400	C.W.	720	250	2300/440
1	300	Whse.	900	250	2300
1	150	G.E.	720	250	2300/440
1	100	Ridgway	1200	275	4000/2300
1	100	C.W.	1200	125	440/220
1	100	Whse.	900	250	2300

### CRANE & MILL MOTORS

Qu.	HP	Make	Type	RPM
1	205/200	G.E.	MDP-420	350/410
1	187	G.E.	MDS-418	435
1	150/200	Whse.	MCA-100	370/300
1	140/100	G.E.	MDA-105	430/500
1	140/100	Whse.	MCA-80	500/415
1	110/85	Whse.	MCA-80	520/450
1	90/70	Whse.	MCB-70	440/400
1	85/65	G.E.	CO-1811	600/500
1	80/54	C.W.	P.W.	575/480
1	65/50	Whse.	MCA-60	475/425
1	50	G.E.	CO-1830	525
1	50	G.E.	CO-1822	750
1	50	G.E.	CO-1810	725
1	45/37	Whse.	K-9	515-470
1	35/45	G.E.	CO-1810	500/450
1	35	G.E.	MDA-104 1/2	450
1	35/50	G.E.	CO-1828	750/850
1	35	G.E.	MDS-416	525
1	40/30	Whse.	MCA-50	525/440
1	30/40	Whse.	MCB-50	525/440
1	35/25	G.E.	MDS-408	575/500
1	20/28	Whse.	MCA-40	650/550

\*Compound wound, all other series

### SLIP RING MOTORS

Qu.	HP	Make	Type	Volts	RPM
1	1800	G.E.	MT-498	2300	337
1	1200	G.E.	MT-26	2200	277
1	700	G.E.	I-M	2300	400
1	600	G.E.	MT-20	2300	380
1	500	Al. Ch.	ANY	2200	514
1	500	G.E.	I-16-M	2300	450
1	400	G.E.	MT-412	2200	450
1	300	G.E.	I-M	2200	600
1	250	Whse.	CW-937	440	1200
1	250	G.E.	MT-414	2300	300
1	250	Al Ch.	ARY	440	720
1	100	G.E.	I-15-M	2300	514

### SQUIRREL CAGE MOTORS

Qu.	HP	Make	Type	Volts	RPM
1	400	G.E.	IK	2300	514
1	300	Whse.	CR 800	2300	1750
1	200	Al. Ch.	A.R.	440/230	580
1	200	Whse.	CR 873 C	2200	1160
1	125	Al. Ch.	A.R.	2300	1750
1	125	Al. Ch.	A.R.	2300	450
1	100	G.E.	KT 562	440/220	570
1	100	Whse.	CR 935	2200	485

### SYNCHRONOUS MOTORS

Qu.	HP	Make	PF	Volts	RPM
1	3000	Whse.	90	4800/2100	720
1	2100	G.E.	100	2300	360
1	2000	G.E.	86	2300	720
1	1750	G.E.	100	2200	3600
1	750	G.E.	80	2300	450
1	710	G.E.	80	2300/440	720
1	250	G.E.	100	2300	514
1	250	G.E.	80	2300	600
1	200	Whse.	80	440/220	1200
1	187	G.E.	80	440/220	720
1	150	G.E.	100	2200	900
1	150	G.E.	80	440/220	450
1	135	G.E.	80	4000/2200	1200
1	125	G.E.	80	2200	900
1	100	Whse.	80	440	1800
1	100	G.E.	80	440/220	600

10 Ton Champion, overhead crane, 95' span or less, will furnish rebuilt for 440/220 volt, 3 phase, 60 cycle or 230 VDC, high speed particularly adaptable for outdoor service, 45' lift.

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### MOTORS & GENERATORS, etc.

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##### Partial Listing Only!

HP	MAKE	TYPE	SPEED
680	Cr. Wh.	131A	514
2-500	G.E.	1M	450
2-450	G.E.	1EM-17B	900
400	G.E.	1M	600
350	Westg.	C.W.	450
300	Westg.	C.W.	1200
250	G.E.	1M-17A	600
200	G.E.	MTP-557	1800
2-200	Westg.	HP-155	600
150	Westg.	HP-155	600
125	G.E.	1M-15	600
100	G.E.	MT-347	1200
100	G.E.	1M	720
100	E.D.		514

##### SQUIRREL CAGE MOTORS

HP	MAKE	TYPE	SPEED
200	Wagner	RP2-26Z	1800
200	G.E.	KF-6635	900
200	Al. Ch.		900
150	Westg.	CS	1200
150	El. Machy.		1200
150	Cr. Wh.	SC-35R	1800
150	G.E.	IK-17	600
125	Cr. Wh.	SC-53R	3600
125	Al. Ch.	AR-226	1800
125	G.E.	IK	1200
100	Westg.	TEPC, CS-6078	3600
100	G.E.	KT-543	1800
100	Westg.	CS	1800
100	Westg.	CS	900

##### LOW & HIGH FREQUENCY

##### A. C. GENERATORS

SIZE	MAKE	CYCLE
10 KW	G.E.	15
10 KW	G.E.	25/60
300 KW	G.E.	25/60
5 KW	G.E.	120
230 KVA	G.E.	150
184 KVA	G.E.	150
15 KW	G.E.	180
25 KW	Howell	180
50 KW	G.E.	210
5 KVA	Sterling	250
7 1/2 KW	G.E.	120

##### DC MOTOR DRIVEN AC GENERATORS

SIZE	MAKE	INPUT	OUTPUT
50 KVA	Star	115	120
50 KVA	Westg.	230	220
81 KVA	Star	115	440
81 KVA	El. Machy.	230	440
12 1/2 KVA	Cr. Wh.	230	240
10 KVA	Burke	110	120
7 1/2 KVA	Hertner	115	220
5 KW	G.E.	230	240

SIZE	MAKE	INPUT	OUTPUT
5 KVA	El. Spec.	115	110
7 1/2 KVA	Cont.	230	120
2 1/2 KW	K & R	115	220

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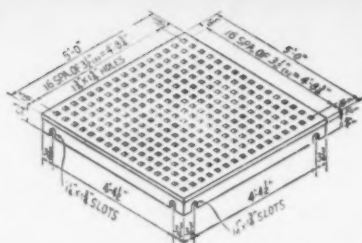
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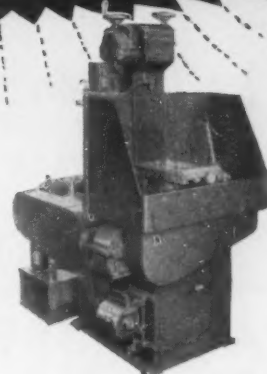
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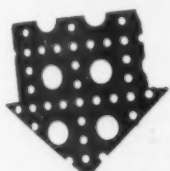


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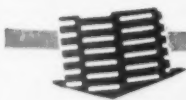
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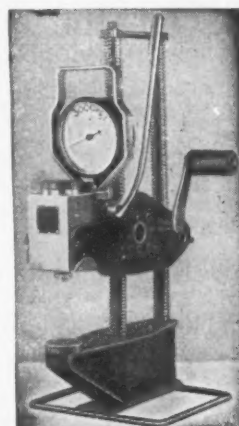
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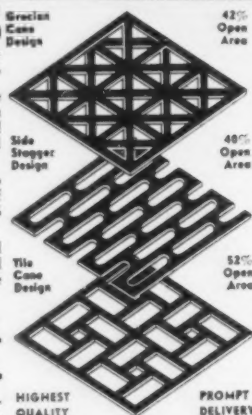
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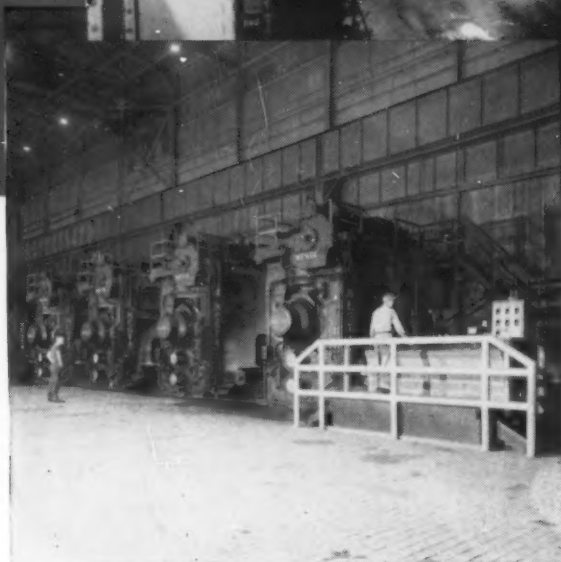
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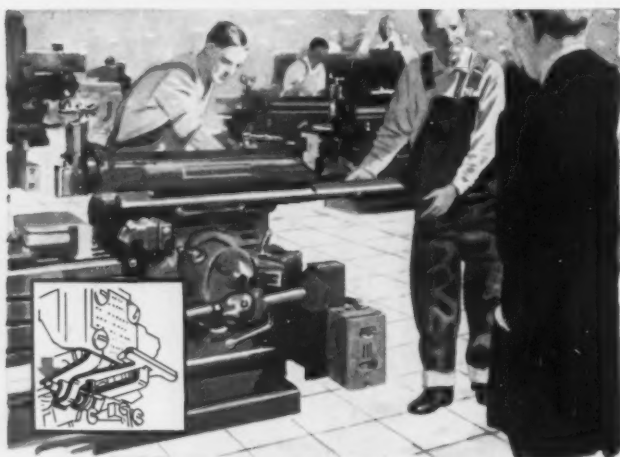
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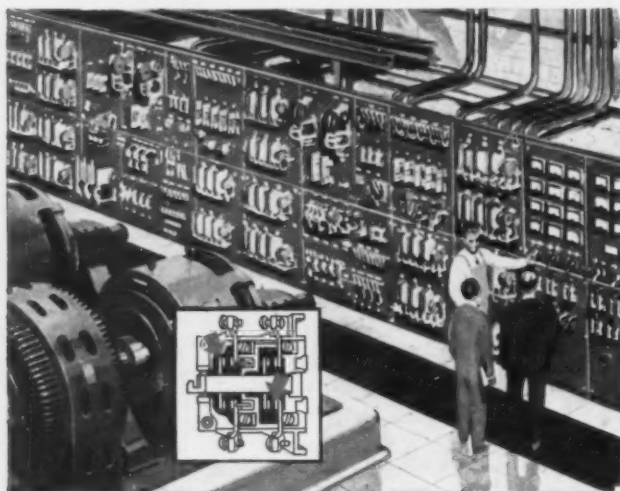
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